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TSM Guide to Training Development and Acquisition for Major Systems

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New emphases are placed on the integration of subsystem developments into the materiel acquisition process for major Army systems. This guidebook describes and illustrates how training development and acquisition activities fit into the Life Cycle System Management Model (LCSMM) for total system development.

Section 1 discusses the need for integrated subsystem development and identifies the main elements of the "systems approach."

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Section 2 presents a generalized training developments model, based on the ISD.

Section 3 outlines the LCSMM. Major milestone events and activities are briefly described and discussed.

Section 4 integrates training development activities with the total system acquisition process and sketches the role of the TRADOC System Manager (TSM) for the conduct and coordination of these activities. 4

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INTRODUCTION AND OVERVIEW

1.1 INTRODUCTION

Introduction of TRADOC System Managers (TSMs) to the development of major Army systems comes at a time when the total systems acquisition process is undergoing major change. The Training System Development and Acquisition Model set forth in this guide attempts to incorporate training acquisition developments into the total system Life Cycle System Management Model (LCSMM). As many of the activities and policies are new and little information exists about how activities are to be carried out, there are significant gaps in the specific implementation procedures to be followed for the acquisition of training for any specific major system. Therefore, users are cautioned that this document can serve only as a guide and should not be viewed as a definitive handbook on training acquisition. Policy and procedures that will allow such specific guidance will come through additional development and experience as system acquisition efforts proceed. This model and procedural guide, then, is viewed by its developers as "Block 1," the starting point from which considerable expansion and revision will be required to produce a final TSM Handbook. Critical review and comments on its organization and content are invited.

1.2 OVERVIEW

1.2.1 Purpose. This guidebook describes training acquisition activities for major systems as prescribed by Army policy for acquisition of

materiel systems. The primary guidance documentation for this work includes Army Regulation No. 1000-1 (effective 1 September 1977) Basic Policies for Systems Acquisition, and Army Regulation No. 1000-2 (final draft version dated 17 January 1977 pending publication of the above AR-1000-1) Operating Policies for Systems Acquisition by the Department of the Army.

1.2.2 Applicability and Scope.

a. The materials in this guidebook are directed to developers (primarily TSM offices) of training subsystems for major materiel systems. While much of the information presented here is also applicable to training acquisition for non-major systems, no attempt has been made to deal with variants from the major systems acquisition model.

b. This guidebook treats the training acquisition process from the concept formulation stage forward, through Initial Operational Capability (IOC). Training development and acquisition activities are organized under 11 major headings, each descriptive of a major set of activities in the total system acquisition process in general correspondence with those in the Life Cycle Systems Management Model (LCSMM).

c. The material in this guidebook is primarily descriptive. The intent is to integrate the training acquisition process with the total system acquisition process through interpretation of existing and proposed Army policies and procedures, and projection of required training development and acquisition activities within the guidance provided by Army policies and procedures. It should be noted that this process of

interpretation and projection may exceed explicit provisions for some activities. Developers are encouraged to assist in the identification of such activities and are further encouraged to exercise critical judgment in evaluating the guidance provided herein.

1.2.3 The Systems Approach. Training acquisition for major systems occurs within the context of the total systems acquisition process. As an integral part of the total developmental effort, training subsystem acquisition activities must be closely coordinated with the activities of other subsystem developmental efforts at each stage in the developmental process. Each subsystem developer, the TRADOC Systems Manager, and the Project Manager must have a good working knowledge of the total system acquisition process, and the role of each major participant in the developmental effort.

Major military systems are complex, sophisticated and expensive. The process to conceive, design and develop, and field systems is long and exacting. New systems must utilize technology at the leading edge to meet their design requirements. The acquisition process is complex and requires state-of-the-art management, coordination, and communication techniques to produce maximally useful and cost-effective systems in a minimal time frame. To be efficient and productive, a system acquisition process must display the following characteristics:

a. Organization - All activities must be clearly specified, with authority and responsibility for each clearly delineated. While the hierarchy for controlling the process should be as flat as possible (i.e., few levels

or layers of management), this requirement must be balanced against the span of control and dispersion of activities reasonable to any one individual or organization.

b. Capabilities - The capabilities required to perform all tasks must be present in the form of trained and experienced personnel, fiscal resources allocated properly, and technology available to carry out required activities.

c. Guidance - Specific goals and objectives are necessary to keep the process on target and to provide criteria for measuring progress. This is a continuing activity in which goals are redefined in terms of changing needs, objectives become refined and operationalized through planning and development, and operational criteria are developed and modified in terms of the identified capabilities and constraints of the developing system.

Secondary level guidance in the form of regulations, procedures, and other guidance documentation is necessary to assure a uniform and orderly developmental effort. Such guidance, to the extent that it is applicable, complete, and specific, provides a structure within which the acquisition process can take place, and fosters the communication and coordination among elements necessary for smooth operation. To the extent that this documentation also contains criteria for judging the processes and products of the effort, then that function will be facilitated.

1.2.4 Requirements of the Systems Approach. The Army is committed to the "System Approach" for the development and acquisition of major materiel items. The term "system" implies the existence of several entities bonded together to produce a higher level, unified entity. Implicit to this definition is the concept that to function properly each component of the total system must make its intended contribution to the total system effort. Conversely, failure of any component will degrade total system functioning. Recognition and acceptance of the interdependence among subsystems should lead to an awareness of the need for an integrated system development effort.

However, recognition of this need is not, alone, sufficient. For almost any system development effort, time and money constraints are severe. The realistic goal should not be "to get the best system," but should be "to get the most effective system for the resources expended." This implies that system developers can deal with these issues:

a. Establish performance objectives for the system as a whole.

b. Identify subsystem requirements that impact total system performance.

c. Identify the technology, costs, and time associated with developing each subsystem.

d. Control the developmental process to ensure that critical requirements of each subsystem are satisfied, while maintaining the flexibility to redirect efforts to assure that total system requirements are met.

Each of these issues constitutes a set of "problems" to be "solved" in the course of system development. At a global level, the LCSMM provides guidance for attacking these problems. A multitude of DOD and Army Regulations, Military Specifications and Standards, Army Pamphlets, Circulars, Manuals, Handbooks, Guides, and other documents provide guidance at varying levels of specificity. Still, system development efforts are not meeting their stated objectives.

1.2.5 Common Developmental Problems. While it is not the purpose of this guide to "rehash" the problems encountered in system development, it is useful to identify how failure to follow system development "rules" may affect the developmental process, and to identify "corrective measures" which should be built into the acquisition process.

a. Excessive Development Time. With the passage of time the "values" of a number of factors making up the rationale for a system will change. The philosophy guiding the development of the system need (MENS), is based on the projected threat at a specified future time. The system is to be tailored to meet the threat and "fit" the total inventory during a slotted time frame. Systems not fielded in this slot may be obsolete in terms of their capability to meet that threat.

As technology advances, new developments provide the capability for new concepts. Shorter development time makes it easier to get new technology "into the pipe" when resources are limited.

Inflation and ongoing developmental costs associated with time will erode acquisition budgets quickly. Conceivably a

two-year delay in a "buy decision" for a large system could totally invalidate the cost-effectiveness basis upon which the acquisition decision was originally made.

b. Poor Integration of Subsystem Developments. While, conceptually, system development is viewed as an integrated, coordinated effort directed toward a single common goal, the reality is that a multitude of individual activities are underway--each with its own problems, its own pace, and its own direction. A successful system is not made up from many "optimized" components, but is a masterpiece of compromises.

Since it is not realistic for the proponent of each system component to be conversant with the way his component will best fit into the overall system, it is likely that he will attempt to influence system design to optimize his component in terms of its inherent needs, and attempt to minimize the "chipping away at its configuration" by proponents of other system components.

Where total system criteria are solid and technology and practice allow a clear "audit trail" to be established between each component and total system effectiveness, then, theoretically, decisions about each component can be based upon a rational trade-off analysis in terms of total system criteria. Often, however, it is not possible to operate in a purely objective manner, with decisions based upon valid empirical information. Then, the

decision process is significantly altered from the ideal model. Some of the factors here are:

(1) Tradition - Components of the system that historically have driven development continue to receive priority until it is demonstrated that a different hierarchy is appropriate.

(2) Technology - Components for which "credible" developmental technology and procedures exist will drive development because the proponents can supply information to "fill in the boxes" in the system decision model, while other proponents will only provide less credible guesses or estimates of parameters upon which decisions are based.

(3) Visibility and Concreteness - It is much easier to understand and work with the concept of a piece of equipment than it is a logistics support system.

(4) Sequence - One view of the development process holds that the equipment development should take precedence over other subsystems, with subsequent development of these components tailored to the needs of the hardware system. This view loses some credence when hardware design requirements imposed on other subsystems exceed reasonable capabilities for these subsystems.

(5) Cost - Actual (or perceived) high developmental costs or end item costs tend to receive emphasis in the developmental program. This is especially

true where the costs are associated with a visible unit, such as a tank, computer system, or aircraft. These items may receive a disproportionate share of attention, unless, instead of developmental and acquisition costs, total life cycle costs are used as the yardstick governing priorities for allocating funds and effort in the overall system development. However, as stated above (Points 2 and 3) the re-alignment of priorities requires realistic and credible data about the various system components.

(6) "Timeliness" - In order for any subsystem to share fully in driving the developmental process, data concerning its "needs" and its interaction with other system elements must be available at those points where critical system decisions are made. This means that early planning and design activities must consider all critical elements, and each element must be developed to the point where trade-off analyses will consider the issues which impact the total system. The number of "unknowns" which must be dealt with in early development make this probably the toughest systems development task, but it is absolutely essential within the systems approach.

To summarize, if the systems concept is to drive the acquisition process, then the overall criterion for development is the contribution of each activity to overall system effectiveness. To achieve this goal the objective is not to optimize, independently, each subsystem but

to achieve the best possible compromise among subsystems to maximize total system effectiveness. This can only be achieved when:

a. All subsystems are developed concurrently.

b. The work on each subsystem is directed to identifying its potential contributions and constraints to the total system effort.

c. Realistic and credible data--empirically derived data--are developed and utilized in the system analysis model from which system decisions are derived.

Finally, cost and time constraints normally set the upper boundaries which limit system goals. Realistically, the goal should not be to acquire the best possible system, but to acquire the most effective system for the resources available.

1.2.6 Modifications to the Systems Acquisition Process. Several policy and procedural changes are now being implemented to upgrade system acquisition efforts.

a. Restructuring the LCSMM. One "cause" of excessive system development time is perceived to be the structure of the LCSMM. It is viewed as somewhat conservative, requiring too many iterations of the basic steps of: Plan - Approve - Develop - Test. Revisions to the LCSMM will essentially remove one developmental iteration by compressing the activities of Full-Scale Development and Production and Deployment into one phase. These changes will increase the scope of activities earlier in the development process as well, with DT/OT II (and ASARC III) assuming some of

the responsibilities formerly attributed to DT/OT III (and ASARC IV).

b. "Enforcing" Developmental Progression Criteria. There is some evidence that systems under development have been allowed to pass from one level or phase of development on to the next without fully meeting the criteria established for the previous stage. Revisions to the LCSMM should bolster procedures for determining, at each developmental stage, whether or not all criteria have been met, and provide guidance that will direct reentrance into the development process to allow additional work and retesting as required prior to moving into the next stage of development. As a minimum, LCSMM revisions should emphasize the importance of testing in terms of total system objectives and goals.

Failure to meet established criteria is probably not the only issue here. It is very likely that some of the problems encountered later in the developmental process are due to incomplete testing at earlier stages. This, in turn, is likely to have been a result of less than adequate criterion development procedures which result in 1) "holes"--areas for which no criteria are developed, and 2) inadequate criteria--criteria which are not stated in sufficiently specific terms to allow definitive testing, are not valid, (i.e., do not represent critical system objectives), or are not amenable to measurement.

c. Integration of Training and Other Support Subsystems into the Total System Developmental Effort. Close coordination among the proponents for Personnel, Logistics and Training is essential to achieve optimum human performance. There are four factors to be considered in ensuring adequate job performance: design, documentation, selection, and training.

(1) Design. Equipment and job procedures should be designed to minimize operator and maintenance requirements.

(2) Documentation. Technical manuals and other performance aids should be made as useful as possible and targeted to the level of the greatest user population.

(3) Selection. Incumbents should possess the basic skills and knowledge requisite to job performance requirements.

(4) Training. Training should be limited to those aspects of the job which are not commonly found in the entering level incumbent's repertoire, should be directly related to job performance requirements, should be presented in modes most effective to the content/learner, etc.

Current conditions do not allow these four factors to vary freely. The body of skills and knowledge, including demonstrated learning skills, possessed by the majority of incoming recruits is limited. Turnover rates for

lower-level personnel preclude extensive training because of cost. Weapons systems are complex and sophisticated with demanding operator, maintenance, and support requirements. Documentation is not designed well for on-the-job use, is targeted to a higher-level audience, and in many cases is incomplete, outdated, and/or not specific enough.

Training programs, for the most part, are outmoded in that they do not take advantage of the most effective instructional technology, and are not systematically developed to ensure job relatedness. The result is an inefficient training program resulting in inadequately qualified job incumbents. The cumulative result of these deficiencies is a considerable gap between the potential operational capability of our fielded forces and the actual capability level at which they are currently operating. (Examples: Weapons that many soldiers cannot fire with the expected degree of accuracy; complex equipment with high downtime rates because maintainers do not have the skills to repair; studies showing exchange of serviceable parts indicating inability to troubleshoot; development of TM supplementary materials to enable job incumbents to function.)

The problems and inefficiencies described above have provided the impetus for the policy and procedural changes now being instituted. From a training viewpoint, these changes should impact the system acquisition process and especially the training acquisition process as follows.

a. Early Involvement in System Design. Training, logistics, personnel and other support subsystem concerns are to be introduced early. This will allow capabilities and constraints from these areas to impact total system design, and will also allow early planning to provide:

(1) Rationales for funding training development.

(2) Identification of training issues to be resolved as part of the validation process, e.g., high-risk tasks.

(3) Longer lead times for training device development.

(4) Embedding training and/or test devices.

It should be noted that changes to the acquisition documentation emphasize the importance of these activities, but do not provide the "wherewithal" for their accomplishment.

b. Integrated Technical Documentation and Training (ITDT). The ITDT program is intended to make job incumbents (especially maintainers) more self-reliant. This is to be accomplished by 1) providing documentation (TM) designed for use on the job, and 2) integrating training development and documentation development processes. Under the ITDT concept it is intended that the documentation serve as a principal vehicle for training (as well as use on the job) and that the principle of adjunctive training be used extensively. Adjunctive training materials will introduce the student to the TM and guide him through the use of these materials. The central

principle of adjunctive training is the extensive use of the TM as the primary instructional resource in the instructional or learning process.

The ITDT requirement will impact the training acquisition process by requiring early developmental work to: 1) Identify mission critical and high training risk tasks as early as possible; 2) conduct the task, behavioral, and learning analyses; and 3) develop and validate prototype documentation, training materials, and associated training devices for those tasks for verification at DT/OT I. This requirement will, in turn, place demands on the training developers to do the necessary preliminary work and planning to ensure that provision for these activities is included in the LOA and Validation Phase contracts.

c. Development of a Master Training Plan. All the elements of the training subsystem should be integrated into a single document. This training plan is the Individual/ Collective Training Plan (ICTP). During the conceptual stage the first draft of the plan will be the OICTP (Outline ICTP). The OICTP will be updated and refined for the Concept Formulation Package (CFP) and the Outline Development Plan (ODP). As the plan matures through DT/OT I and ROC, it will be revised and incorporated into the Development Plan (DP) as the ICTP.

The purpose of the ICTP is to have a single or "master" training document which addresses all training issues. This document will provide the central point from which

the trainer's position on the diverse activities affecting training will emanate. Portions of the ICTP will also be integrated into other acquisition documentation (e.g., the training test plan will be incorporated into the total system coordinated test plan).

SECTION 2

TRAINING DEVELOPMENTS MODEL

2.1 APPROACH

The approach for constructing the training subsystem acquisition model was to first identify the essential steps for identifying training needs and training developments, and then integrating these activities into the total Life Cycle System Management Model. This generalized training developments model is presented in Figure 2.1.

[Figure 2.1 about here]

A more detailed breakout of the activities in each block is contained in Figures 2.2-2.7.

2.2 SYSTEM CONCEPTS

Block 1, "System Concepts" portrays the initiating conditions for system development.

[Figure 2.2 about here]

The system need, doctrine, material capability, support capability and organization all come together to generate system concepts with potential for neutralizing the threat. In the life cycle model these activities comprise the material concept investigation, the initial set of activities of the conceptual phase.

The development of system concepts is pursued on two fronts: 1) criteria for system performance (operational capability objectives, or science and technology objectives, and capability goals) are generated on the basis of the level and nature of the perceived threat,

GENERALIZED TRAINING DEVELOPMENTS MODEL: OVERVIEW

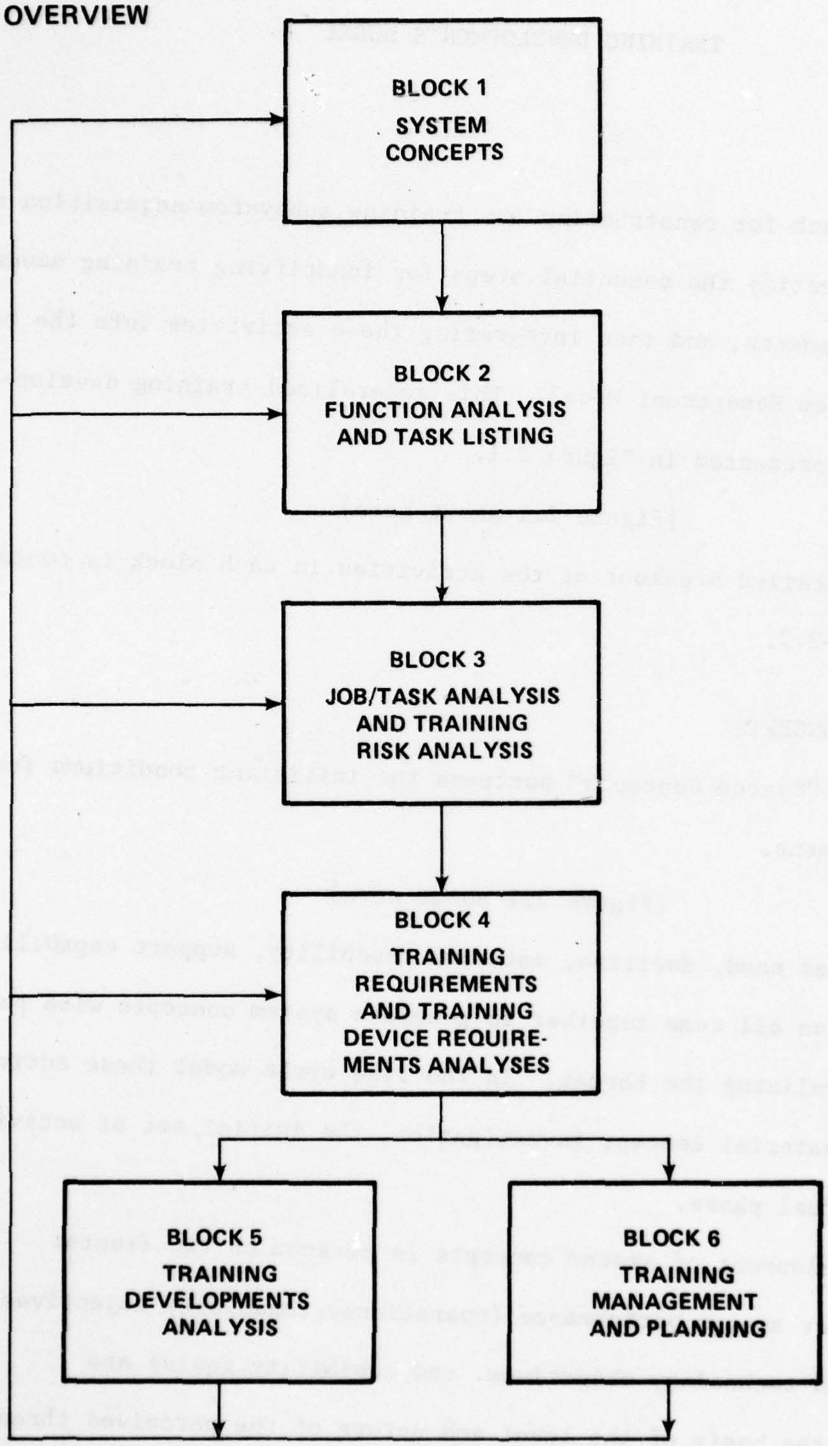

Figure 2.1. Generalized Training Developments Model: Overview

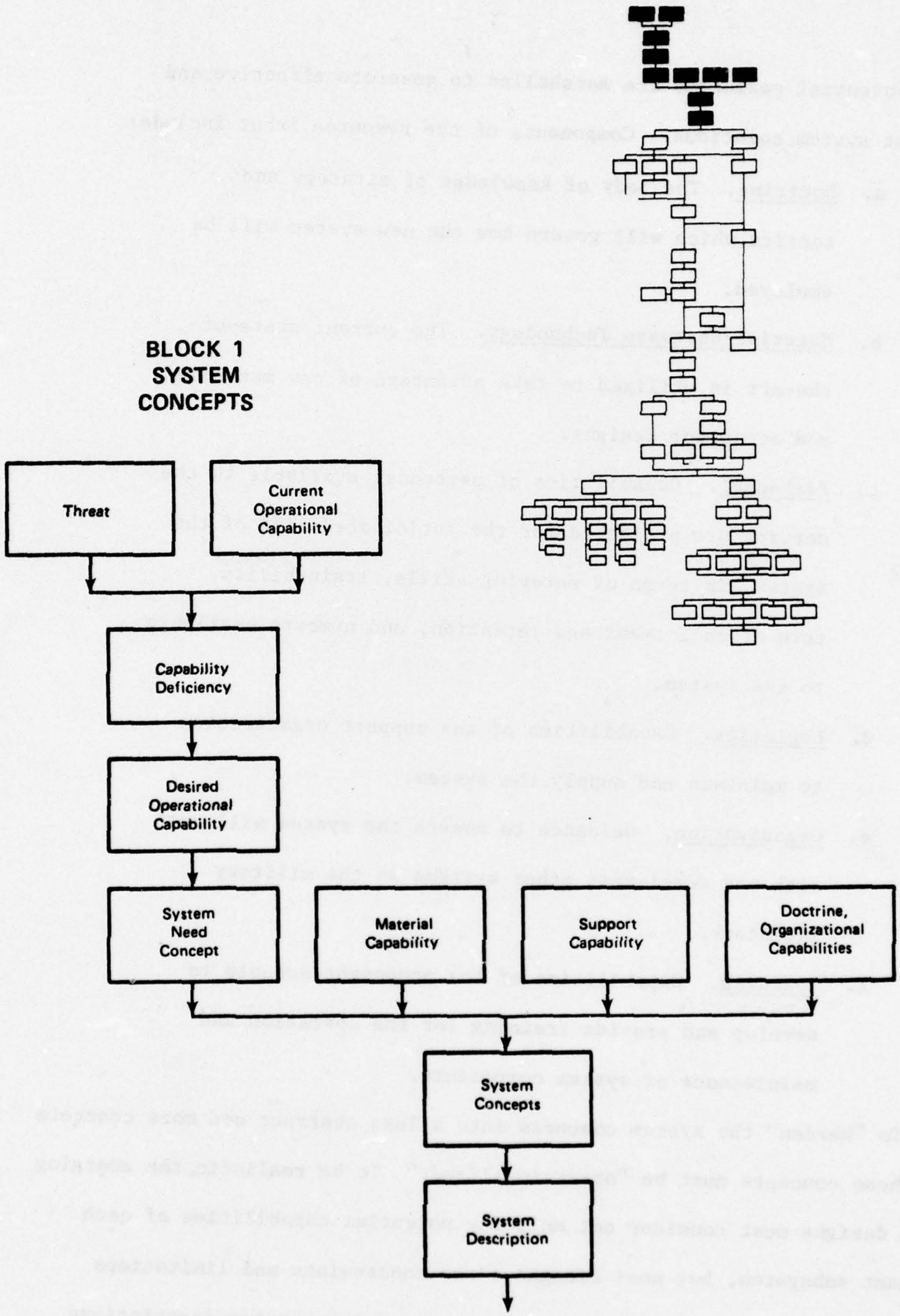

Figure 2.2. Block 1 System Concepts

and 2) potential resources are marshalled to generate effective and efficient system solutions. Components of the resource front include:

a. Doctrine. The body of knowledge of strategy and tactics which will govern how the new system will be employed.

b. Materiel/Software Technology. The current state-of-the-art is utilized to take advantage of new materials and equipment designs.

c. Personnel. Capabilities of personnel available to the service are projected for the anticipated life of the system, in terms of entering skills, trainability, term of enlistment and retention, and numbers available to the system.

d. Logistics. Capabilities of the support organization to maintain and supply the system.

e. Organization. Guidance to ensure the system will mesh with and complement other systems in the military inventory.

f. Training. Capabilities of the proponent schools to develop and provide training for the operation and maintenance of system components.

To "harden" the system concepts into a less abstract and more concrete form these concepts must be "operationalized." To be realistic, the emerging system designs must consider not only the potential capabilities of each component subsystem, but must recognize the constraints and limitations of each as well. System concepts are translated into system descriptions

by proceeding from statements about what the system is to achieve (goals, objectives) to statements about what has to be done, i.e., who or what will perform various system functions. These statements are drawn up within the context of scenarios, (e.g., SCORES).

2.3 FUNCTION ANALYSIS AND TASK LISTING

The activities portrayed in Block 2 are similar to elements of a Front End Analysis (FEA) performed as part of the logistics subsystem developmental effort.

[Figure 2.3 about here]

This term (FEA) is not used here because this analysis is not limited to identifying and describing maintenance tasks. The objectives of this activity are to:

a. Develop the Mission Profile.

b. Identify human-machine interfaces.

c. Develop an initial listing of tasks.

d. Within this listing, identify mission critical tasks.

2.3.1 Mission Profile. The mission profile consists of a list of "tasks and conditions" for system employment in military operations. Task statements are rated (or ranked) in terms of frequency of occurrence and urgency. A mission profile should be developed for each system alternative and is derived from the operational capability objective (OCO) or STOG and the system description. A "first cut" mission profile should be drafted at the system concept stage and this rough draft version refined and updated as system concepts are developed and translated into more specific functions. A key input from the mission profile to the development process is guidance for establishing the criticality of system functions and, subsequently, the criticality of tasks. The mission profile is included in the LOA as "Annex A."

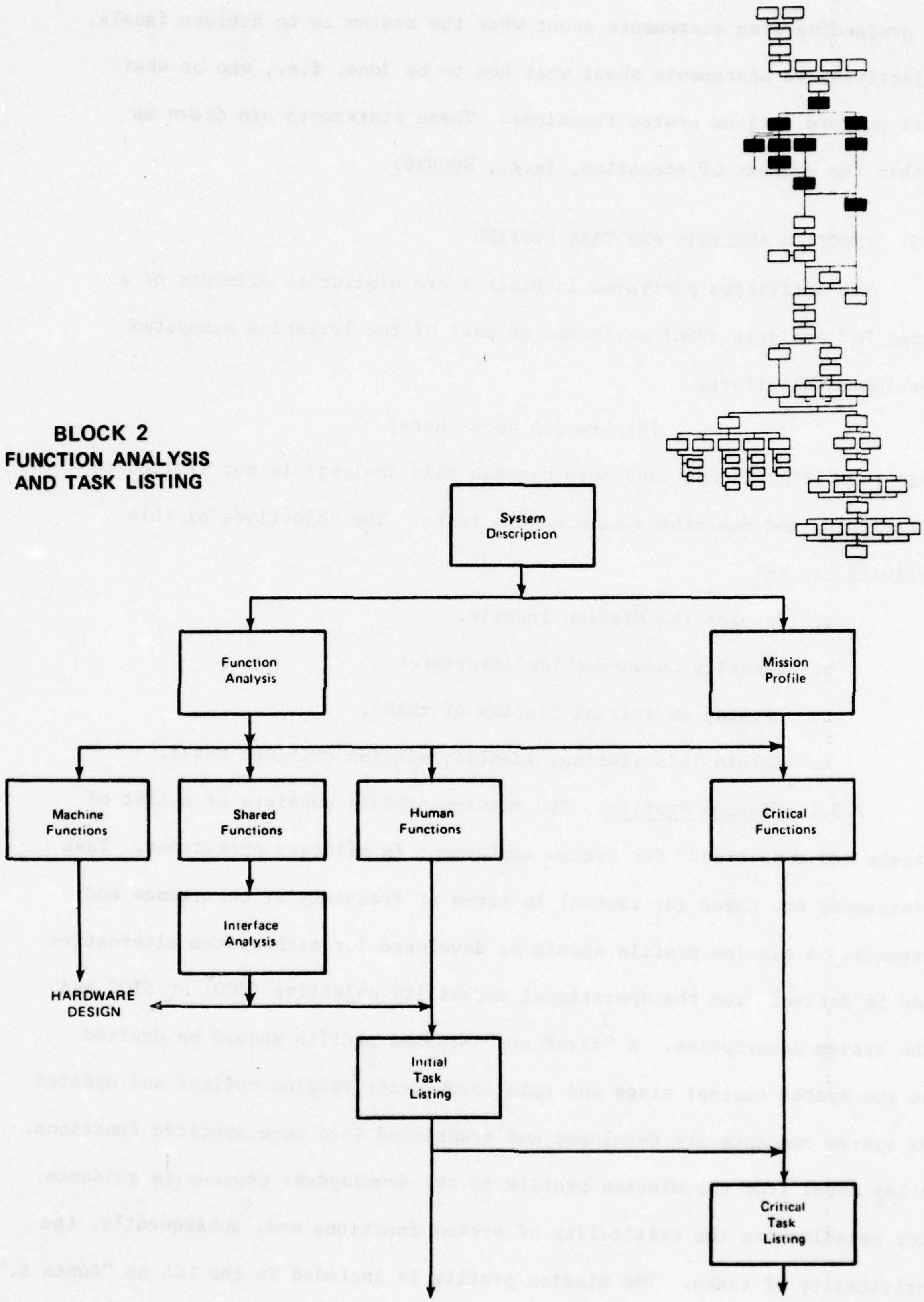

Figure 2.3. Block 2 Function Analysis and Task Listing

2.3.2 Function Analysis. This step in the system development process is to determine how various system objectives are to be accomplished, and to assign these functions to various components, sub-components, and elements. A part of this step is the discrimination of those functions best performed by humans from those to be performed by machines/equipment. At this level, three output classes are appropriate:

a. Machine functions

b. Human functions

c. Man/machine (shared) functions

Shared functions are critical to the development of training because they identify prime candidates for training devices and simulators, and embedded testing and training capabilities.

It is likely that much of the system will not be sufficiently developed at this point to allow complete specification and assignment of functions. This function analysis and allocation step should identify gaps, and should be especially sensitive to gaps at the man/machine interface. These "missing areas" of the system which cannot be analyzed in greater detail may be identified as unknowns and included in the LOA as issues requiring further study and development.

The analysis is iterative, and the added degree of specificity resulting from the functional analysis should permit the mission profile to be updated. This update may then be used to rate or rank the criticality of mission functions.

2.3.3 Interface Analysis. Shared functions, which by definition imply heavy interaction between human and machine components, are developed and described in more detail:

a. To identify machine design parameters related to human

functions, (e.g., locating indicators where they are visible to operators of associated controls).

b. To break out human functions to a level of detail sufficient to identify tasks.

c. To develop interface operating parameters, e.g., "sensing and feedback characteristics" required for operators, control characteristics, and other operability and maintainability characteristics and/or requirements, redundancy, etc.

The interface analysis provides critical inputs to equipment design and establishes the framework within which training device requirements can be generated. Depending upon the type and complexity of the system, this step may be extremely critical, as many of the most critical and high risk tasks will occur at the man/machine interfaces. The capabilities of the expected operator population must be factored into the interface design.

2.3.4 Initial Task Listing. The "human functions" and (as appropriate) interface analyses are inputs to the derivation of the initial task listing. Essentially, this step is a restatement of functions (what must be accomplished) or outcomes into a list of activities which must be performed in order to achieve the system objectives.

The initial task listing is a juncture for two lines of activity which follow. The initial task list is reviewed and culled to produce a listing of critical tasks. These tasks are then subjected to a relatively intensive analysis. The remaining tasks are analyzed at this point only to the degree that will allow a reasonable estimate of training requirements to be derived, and high-risk, but not mission-critical, tasks identified.

2.4 JOB/TASK ANALYSIS AND TRAINING RISK ANALYSIS

Activities in Block 3 take the training analysis from the initial task listing to a point where mission critical/high risk for training tasks can be specified.

[Figure 2.4 about here]

2.4.1 Job/Task Analysis. To the extent possible, tasks are broken out into sub-tasks and task elements to a level of detail that will permit inferences to be made about behaviors required in their performance.

2.4.2 Behavioral Analysis. The detailed task analysis inputs the behavioral analysis. Skills and knowledge required to perform the elements of each task are identified and listed in behavioral terms. This step completes the chain of analysis from the system function level to a level at which individual task element behaviors are specified.

2.4.3 Training Risk Analysis. The concepts of training risk and mission criticality have been separated in the developmental process. The rationale for this being that the criteria are independent and conceptually unrelated. Mission criticality has no logical bearing on the level of difficulty of task performance or the perceived degree of uncertainty about how to train. The purpose of the training risk analysis is to order or rank tasks according to training risk. Some candidates for training risk criteria might be:

a. Level of skill or knowledge required or proficiency level.

b. Complexity (number of skills and amount of knowledge required).

c. Training "distance" (the "distance" between skill and knowledge levels of trainees at entry level and the levels required for proficient performance).

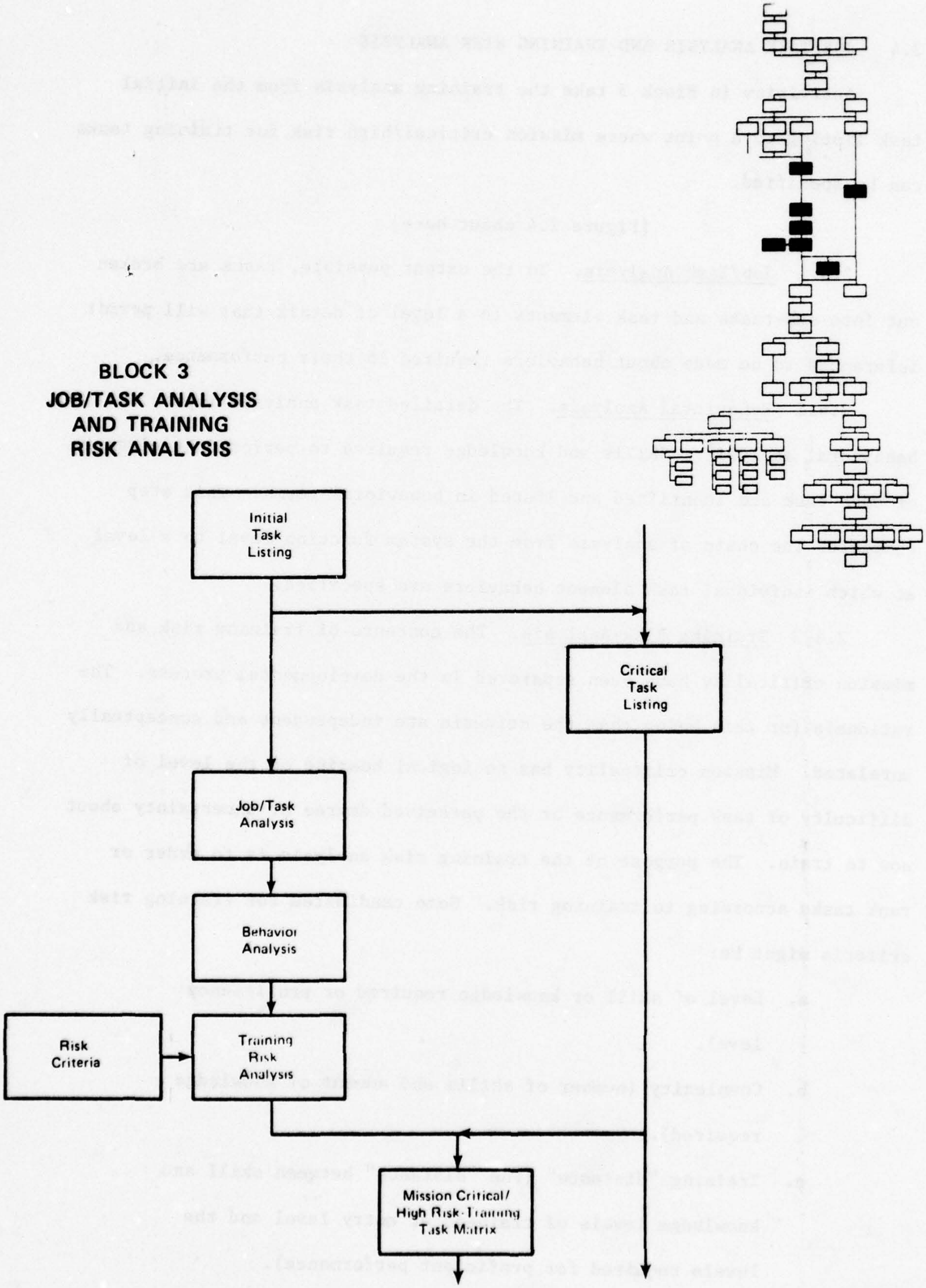

Figure 2.4. Block 3 Job/Task Analysis and Training Risk Analysis

d. Skills requiring unusual capabilities or abilities, those not particularly abundant in the typical operator population.

e. Areas in which skill enhancement/development techniques are not particularly well understood or training techniques are not well developed.

2.4.4 Mission Criticality/Training Risk Matrix. From the steps above, rating and/or ranking of tasks on two sets of criteria will be done. Tasks are assigned to cells in a criticality/risk matrix. Priorities for training development during the validation phase will be dependent upon the placement of tasks in the matrix. Critical, high-risk tasks should be listed in the LOA and should be included in the work to be performed as part of the Validation Phase contractor effort.

2.5 TRAINING REQUIREMENTS AND TRAINING DEVICE REQUIREMENTS ANALYSES

[Figure 2.5 about here]

In order to begin planning for the development of the training subsystem it is necessary to make preliminary decisions about which tasks are to be trained and the means for training. The ISD procedure provides guidance and criteria for the selection of tasks to be trained, and similar procedures are either available or under development (e.g., STEPS) for identifying and specifying training device requirements, embedded test equipment, and embedded training. If training developers are to impact the early design stages of system development (pre-LOA), a preliminary training requirement analysis is necessary--even if it must be based on rather sketchy task data. Minimally, the outputs from this analysis (first iteration, pre-LOA) should identify the major training issues to

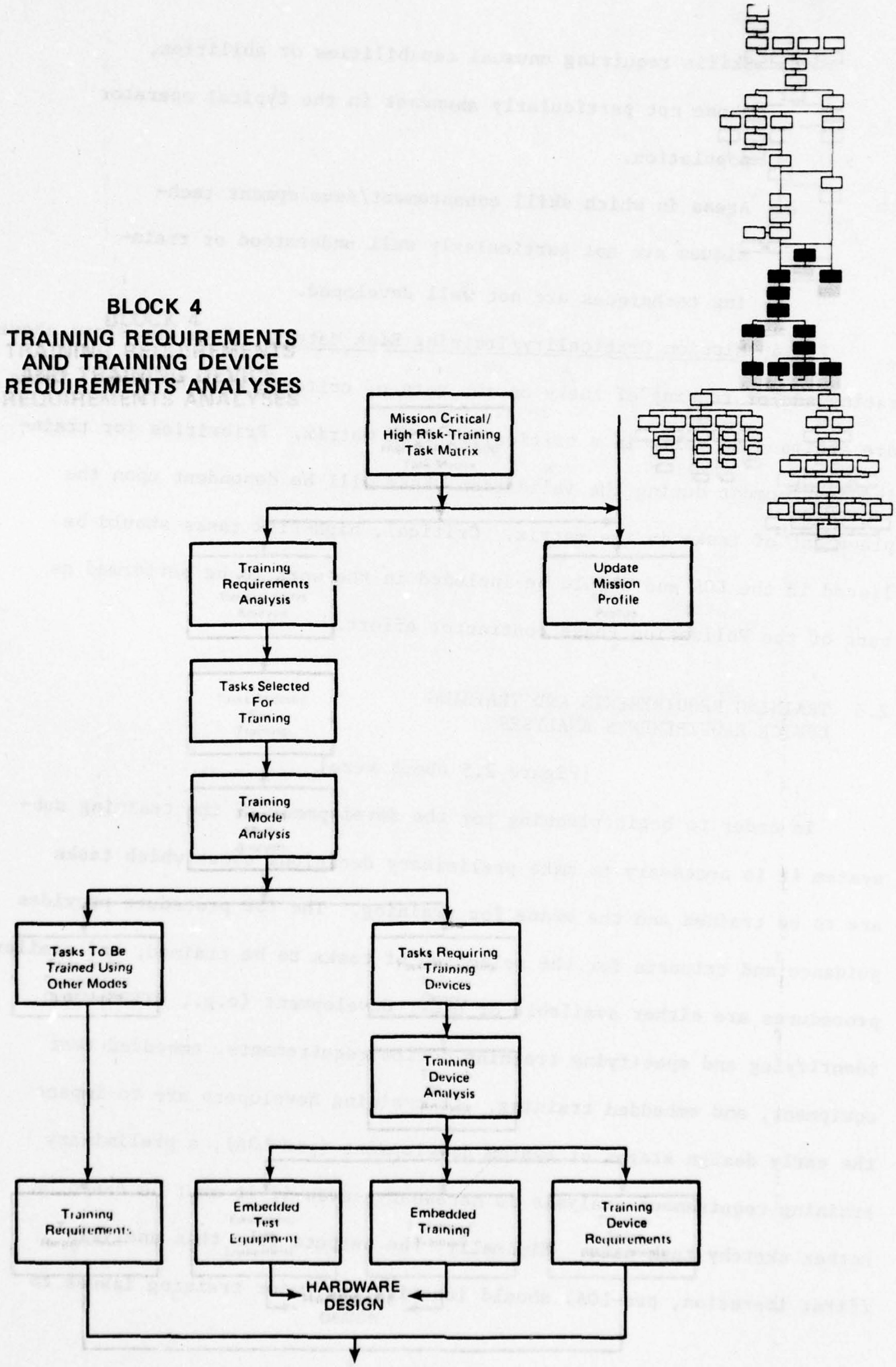

Figure 2.5. Block 4 Training Requirements and Training Device Requirements Analyses

be studied and resolved during the validation phase of system developments to allow specification of training devices, embedded training, and embedded test equipment requirements.

2.6 TRAINING DEVELOPMENTS ANALYSIS

[Figure 2.6 about here]

Normally, the activities under Block 5 are combined with those in Block 6 (Figure 2.7, Training Management and Planning) as an overall training plan. They have been separated here for two reasons:

a. Training development activities are primarily "technical" while activities related to the planning and management for training administration require organizational and management skills.

b. Implementation of a large scale training operation is a complex undertaking and should be recognized as such.

Training developments planning is essentially the preparation of a blueprint for the development and acquisition of training materials and associated documentation. Also included are the technical means for ongoing assessment of training, and plans for validating training materials as they are developed (formative testing).

Outputs from the training developments analysis feed the total system development process in several ways:

a. Developer requirements and validation plans provide guidance for establishing contractor requirements and help specify tasks (e.g., training validation) other than materials development which are to be included in the RFPs for validation and full-scale development.

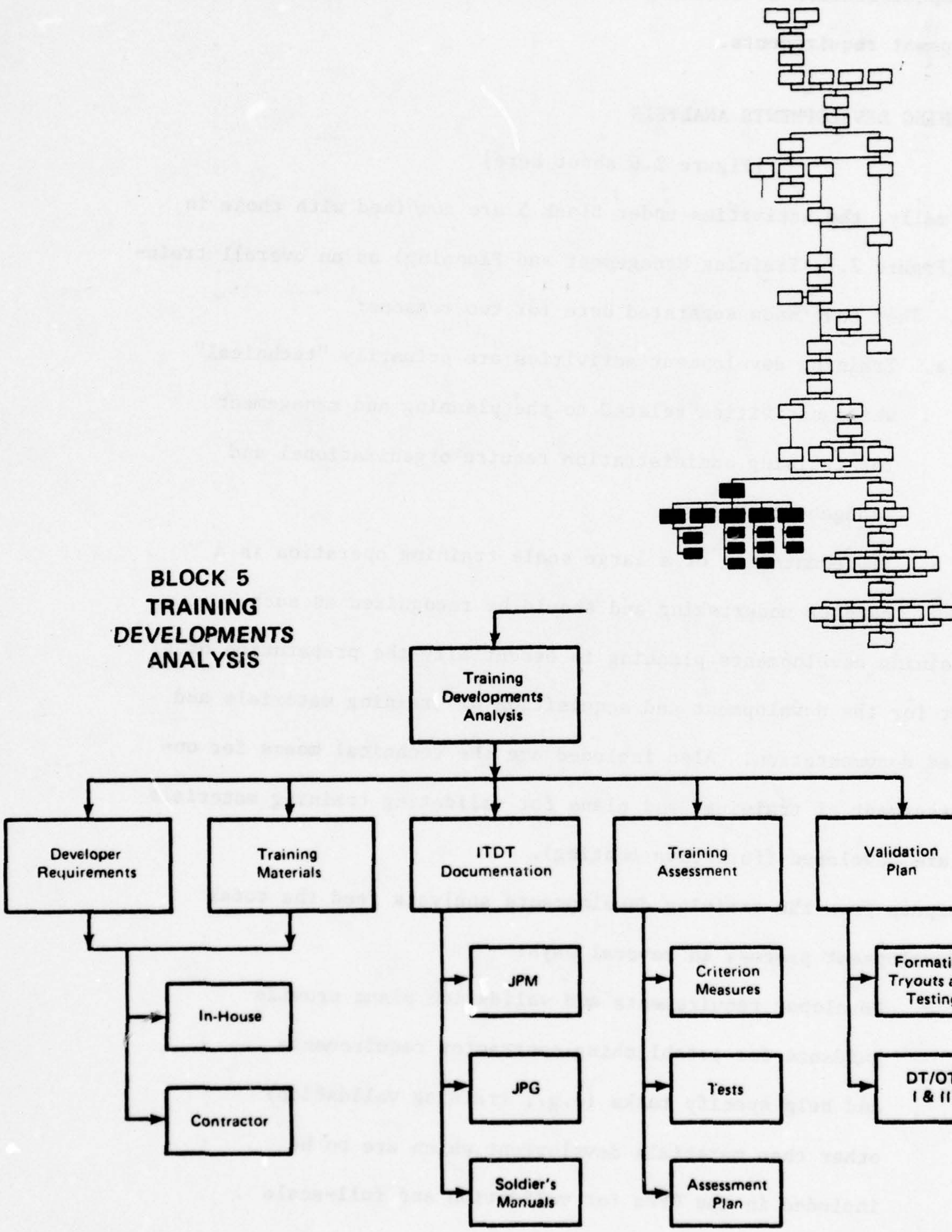

Figure 2.6. Block 5 Training Developments Analysis

b. The components of the validation plan dealing with Army conducted Developmental and, especially, Operational Testing feed into the Coordinated Test Program.

c. ITDT and other training material requirements compose the major training input to the RFP for contractor and/or in-house developed training materials and documentation.

d. Training assessment planning provides inputs to SQT and ARTEP developers and to training management planners.

e. All of the training developments analysis outputs are of interest to the developers of baseline cost estimates during early stages of system development, and will also input CTEAs and COEAs at each stage of system development.

2.7 TRAINING MANAGEMENT AND PLANNING

[Figure 2.7 about here]

The primary activities in Block 6 are:

a. A "quantitative" training analysis to develop estimates of the number, types, and distribution of individuals to be trained, and of overall training time requirements.

b. A "management" analysis to determine the training support requirements, e.g., staffing, facilities, supplies and materials, and management or administrative requirements at both the institution and unit training levels.

c. Training planning to develop specifications for:

(1) Establishing the training support organization.

BLOCK 6
TRAINING
MANAGEMENT
AND PLANNING

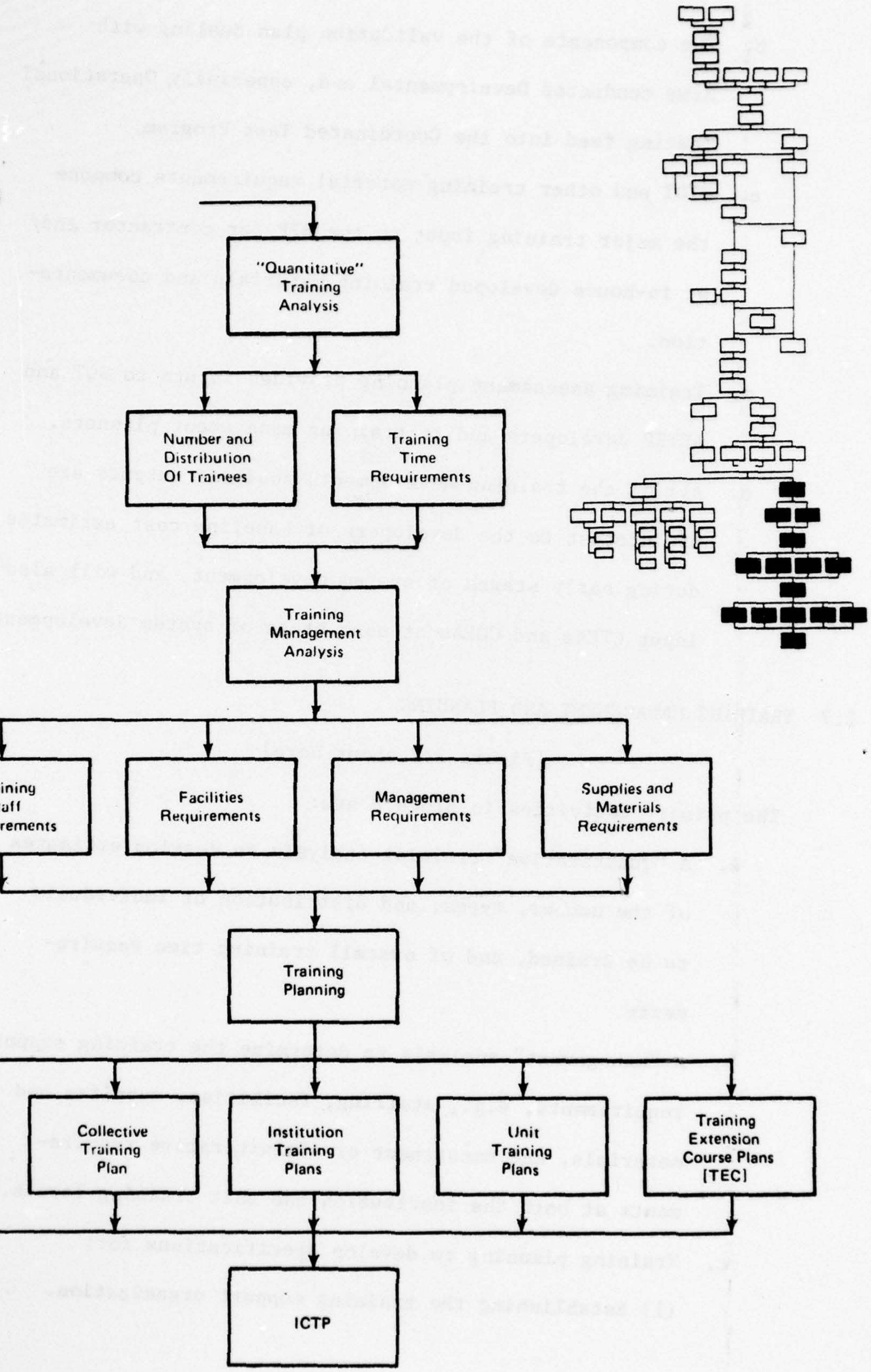

Figure 2.7. Block 6 Training Management and Planning

(2) Executing the implementation of training as the system goes through IOC and is fielded.

(3) Operating the training subsystem over the system life cycle.

The outputs from these activities form the Outline Individual/Collective Training Plan (OICTP) during the early stages of system development and provide training subsystem inputs to the LOA, Concept Formulation Package (CFP) and Outline Development Plan (ODP). The OICTP is periodically updated and becomes the ICTP as the system moves into full-scale development.

The development of the OICTP requires extensive coordination with other developers. The quantitative training analysis, for example, is heavily dependent on information about the composition of the personnel subsystem and schedules for recruitment and reassignment of personnel to man the new system. Similarly, planning for extensive training in the unit requires a commitment of resources to produce the training capability in the field organizations.

SECTION 3

AR 1000-1 and the LCSMM (Army Pamphlet 11-25) provide overall guidance for the conduct of system development and acquisition activities. Activities within the LCSMM fall into four major phases: Conceptual, Validation, Full-Scale Development, and Production and Deployment. This section will briefly review events and activities in each phase. Figure 3.1, from AR 1000-1, provides an overview of the materiel acquisition process for major systems. (See Appendix A for a synopsis of AR 1000-1.)

[Figure 3.1 About Here]

3.1 CONCEPTUAL PHASE

In this phase the technical, military, logistic, and economic basis for the program, and concept feasibility are established through studies and evaluation of experimental hardware (AR 71-3).

3.1.1 Materiel Concept Investigation (Event 1). TRADOC conducts continuing analyses of mission areas to identify mission elements for which capability is deficient. Identified needs are documented in a Mission Element Needs Statement (MENS), in terms of the operational task to be accomplished. A Science and Technology Objective Guide (STOG) is prepared describing an operational capability for which technical feasibility has not been proven and achievement is desired in a specified time frame 10 or more years in the future.

3.1.2 Letter of Agreement (LOA) (Event 2). The LOA is prepared jointly by the Combat Developer and Materiel Developer in accordance

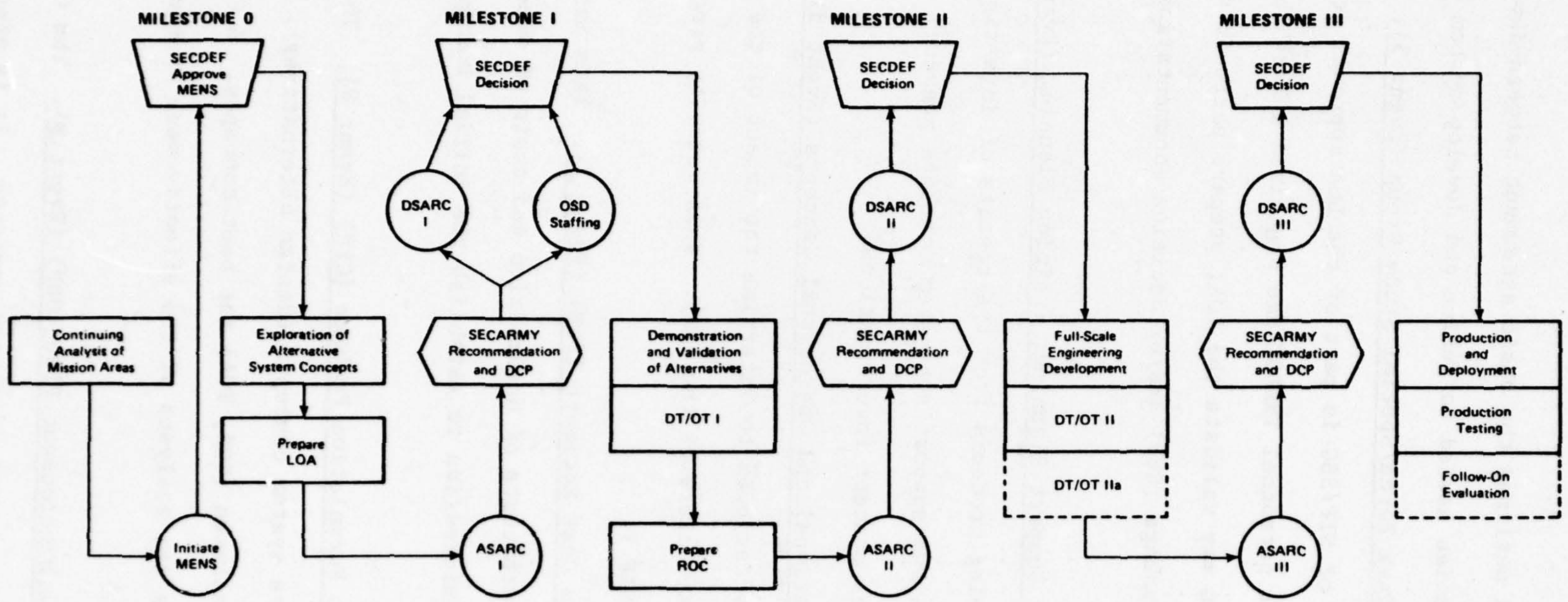

Figure 3.1. Material Acquisition Process for Major Systems

with AR 71-9. The LOA outlines the basic agreement between developers and identifies the studies needed to define and develop system concepts.

3.1.3 Special Task Force/Special Study Group (Event 3). For major systems establishment of STF/SSG is part of the LOA approval action. To assist in selection of personnel TRADOC has organized a Task Force Planning Group (TFPG). STF/SSG may validate the LOA, prepare parts or all of the Concept Formulation Package (CFP) and/or decision documentation (DCP, APM, DPM).

3.1.4 Logistic Support Planning, Training Planning (Events 4, 4A). Support systems planning proceeds from the results of investigations identified in the LOA and support subsystem concepts prepared during and following the materiel concept investigations.

3.1.5 Organizational and Operational Concepts (Event 5). Organizational structures are reviewed to determine the impact of the proposed system on the force structure of the Army. This activity precedes development of PQQPRI and BOIP I.

3.1.6 Baseline Cost Estimate (BCE) (Event 7). This initial cost estimate addresses both costs of acquisition and costs of ownership and provides unit cost information to establish the initial Design to Cost (DTC) goal.

3.1.7 Concept Formulation Package (CFP) (Event 8). The CFP evaluates alternative system concepts (design alternatives), and selects, through trade-off analyses (TOD, TOA) the best concepts. A COEA is prepared documenting the analyses of the effectiveness of the selected concepts.

3.1.8 Outline Development Plan (ODP) (Event 9). The ODP is a plan for advanced development (AD) of system concepts. It is prepared prior

to entry into the validation phase and, in conjunction with the LOA is a document of record to support entry into AD.

3.1.9 Systems Acquisition Review Councils (Events 12-14). ASARC I and DSARC I determine whether or not the Conceptual Phase has been completed and determines if the program is ready for transition to the Validation Phase. An approved Decision Coordinating Paper (DCP) constitutes a contract between OSD and the Army.

3.2 VALIDATION PHASE

Validation activities resolve problems identified during the Conceptual Phase, verify preliminary design and engineering, and prepare contracts as required for full-scale development. The validation process may be conducted by competitive or sole-source contractors, or by in-house development centers.

3.2.1 Advanced Development Prototype Contract (Event 16). The ODP is updated, specifications for work prepared and contracts awarded.

3.2.2 Inputs to DT I and OT I and Preparation of Test Design Plans (Events 19 and 20). DT I and OT I are to test the adequacy of concepts for employment, maintainability, supportability, organization, doctrinal, tactical and training requirements, and related critical issues. Inputs to the Coordinated Test Program (CTP) include test design plans and test support packages.

3.2.3 Development Test I and Operational Test I (Events 21 and 22). DT I and OT I may be conducted separately or coordinated in a single test program. DT I is to demonstrate technical feasibility and to ensure that technical risks have been identified and resolved. OT I is conducted to provide an indication of military utility and worth to the user and to

provide data leading to the decision to enter Full-Scale Development. Results of testing, and evaluation reports are prepared and distributed.

3.2.4 Update Subsystem Plans (Events 25-30). Logistics, personnel, training and organizational plans are updated prior to entry into the next developmental phase. Developmental requirements, cost estimates and personnel requirements are revised and planning initiated. PQQPRI, BOIP-I, and TMOS documents are prepared. ICTP and LSA are revised. Training Device Requirements (TDR) are specified.

3.2.5 Required Operational Capability (ROC) (Event 31). The ROC is prepared. It is a HQDA document which states concisely the minimum essential operational, technical, logistical and cost information necessary to initiate Full-Scale development or procurement of a materiel system.

3.2.6 Special Task Force/Special Study Group (Event 32). Upon approval of the ROC the determination will be made for the need of a STF or SSG (as described in Event 3).

3.2.7 Development Plan (DP) (Event 33). Following ROC the ODP evolves into the DP for Full-Scale Development. The DP constitutes a definitive plan for management of the program to accomplish the objectives addressed in the ROC.

3.2.8 Systems Acquisition Review Councils (Events 37-42). Validation IPR, ASARC II, or DSARC II, as applicable, are held upon completion of advanced development to assess the results of the Validation Phase and to ensure the system is ready to proceed to Full-Scale development.

3.3 FULL-SCALE DEVELOPMENT PHASE

During this phase a system, including all support items, is fully developed, tested and initially type-classified. Preparations to field an integrated system are finalized, including BOIP, personnel and equipment requirements, publications, ILS, and modifications of doctrine, organization and MOS.

3.3.1 Engineering Development (ED) Contract (Event 45). Materiel and support requirements are prepared from the DP. RFPs are prepared and criteria established for evaluating contractor proposals. Contracts are awarded and developmental activities monitored.

3.3.2 Inputs to DT II and OT II and Test Design Plans (Events 46-50). A coordinated test program is developed to provide a comprehensive evaluation of system components and to ensure the system meets its overall operational goals. Test support packages are prepared.

3.3.3 Development Test II and Operational Test II (Events 51 and 52). DT II demonstrates the technical capability of the materiel and support systems, and verifies that all design and supportability issues have been resolved. OT II provides an assessment of the system's military worth and operational effectiveness in a realistic operational environment by using TOE units or elements from normally assigned troops. Test reports and independent evaluation reports are prepared for the decision process leading to Full-Scale production.

3.3.4 Update Subsystem Plans (Events 57, 57a, 59, 60, 84, 85, 99). Logistics, Personnel, Training and Organizational plans are updated. Draft TOE, QQPRI, MOS, and BOIP-II are prepared. As required, the DP is updated.

3.3.5 Development Acceptance and Type Classification (Events 69-71). ASARC III is held to develop recommendations for entry into full-scale or limited production. If all critical issues have been resolved the system will be type classified STANDARD.

3.4 PRODUCTION AND DEPLOYMENT PHASE

During this phase support subsystems are established and implemented, operational units are trained and the materiel system is acquired and distributed.

3.4.1 Full-Scale Production Contract (Event 102). System production contracts are awarded. The procurement includes support items which must be available prior to release for issue of the materiel system.

3.4.2 Army Authorization Documents System (Event 103). TOE proponents document requirements for published TOE or TOE Changes. Equipment TAADS are established in accordance with approved BOIP II. CTA proponents document BOI upon type classification of the system.

3.4.3 Individual and Collective Training (Event 104). Individual and collective training begin following: final MOS decision; TOE approval; personnel requirements determined; schedule of training inputs determined; NET completed; training equipment, aids and devices issued.

3.4.4 Initial Operational Capability (IOC) (Event 105). IOC is attained when the first unit is equipped with production items, personnel are trained, and the unit has the capability to adequately support the item in the field.

3.4.5 Unit Training (Event 106). Unit training is conducted in accordance with Soldier's Manuals and Skill Qualification Tests. Training extension courses, prepared by the proponent school, are utilized.

NET teams will train a cadre of personnel within the unit who will then conduct training.

SECTION 4

TRAINING ACQUISITION WITHIN LCSMM

4.1 ORGANIZATION

The material in this section is organized around 11 LCSMM events listed in Figure 4.1.

[Figure 4.1 about here]

Each of these events consists of a set of activities which culminate in one or more system products, e.g., Letter of Agreement, Outline Development Plan, Developmental/Operational Test Results. While there are many more LCSMM events than the 11 we have identified as "milestone events" (the LCSMM describes 119 discrete events), most can be subsumed under these 11. The objective here has been to provide a manageable number of LCSMM events for "keying" training development activities, without losing the "sense" of the LCSMM through excessive condensation. Figures 4.2 through 4.12 depict major training development and acquisition activities within the LCSMM.

4.2 SYSTEM CONCEPTS

[Figure 4.2 about here]

Threat analyses and/or developing technology lead to consideration of new system concepts. The rationale for new system developments is a defined capability deficiency, i.e., a perceived threat which cannot sufficiently be met by existing (or planned) systems. A Mission Element Needs Statement (MENS) documents this deficiency.

4.2.1 STOG. The first system development task is to define the capability required to meet this threat in terms of system performance

LCSMM

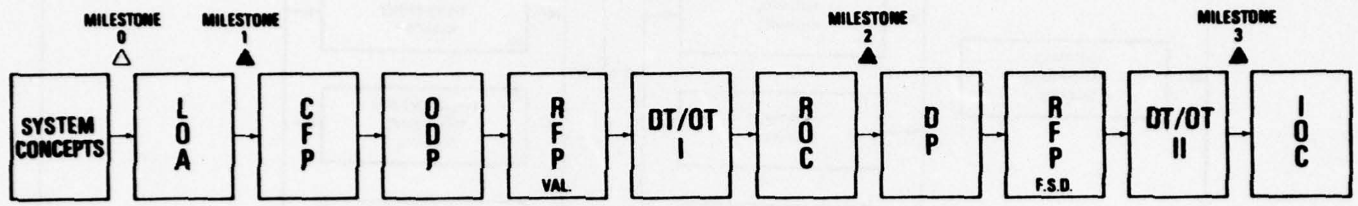

Figure 4.1. LCSMM

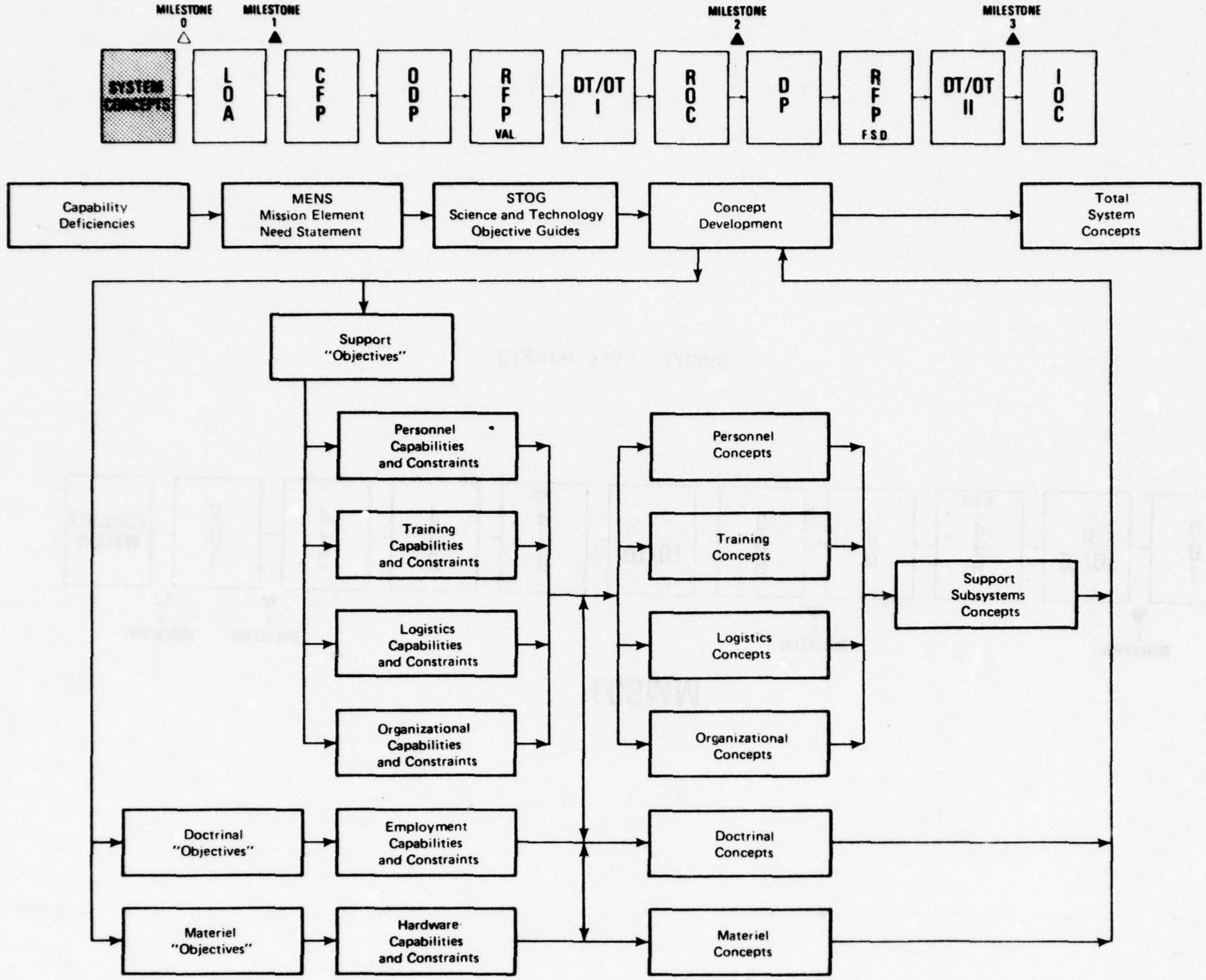

Figure 4-2. System Concepts

objectives. Science and Technology Objective Guides (STOG) are developed for specific scenarios and placed in a time frame when the threat is likely to materialize. Development of the STOG is the responsibility of Combat Developments (CD) and is part of their ongoing analysis activity. STOG provides the baseline from which system and subsystem developments are initiated.

Activities in three areas are begun following publication of a STOG:

a. Hardware or materiel system development

b. Support system development

c. Doctrine development

4.2.2 Subsystem Objectives. At a general level, objectives for each subsystem are formulated. Development of objectives is guided by three factors:

a. Subsystem "philosophy"

b. Subsystem capabilities

c. Subsystem constraints

A subsystem philosophy is the accumulated body of knowledge, experience, and policy that determine how subsystem functions are to be accomplished (e.g., "how to fight" manuals). These philosophies provide an overall theory or structure for each activity.

Subsystem capabilities are existing, demonstrated, techniques, methods and resources. The capabilities are brought to bear on the system "problem" to provide solutions and contribute to system development.

Subsystem constraints are the limitations and restrictions imposed by a subsystem, which must be considered by other subsystems.

It is the responsibility of each subsystem proponent to provide state-of-the-art capabilities within his area of expertise, identify the

constraints of system development imposed by the requirements of his activity, and "adapt" the capabilities of his activity to the constraints of others.

The proponent for each subsystem (and for each component within subsystems) prepares a statement of subsystem objectives that is responsive to the total system STOG. These objectives will, of necessity, be quite general, but should be as specific and comprehensive as possible, as they form the basis for generating system concepts. These objectives are "first cut" performance standards and do not deal with the means by which systems objectives are to be met.

4.2.3 Subsystem Concepts. System concepts are generated through analysis of capabilities and constraints within the philosophy of each proponent subsystem. Often, a number of alternative concepts will be developed. The key elements of the concept formulation process are:

a. Concepts should be tailored to statements of objectives.

b. Concept formulation must consider both capabilities and constraints.

c. A justification for each concept should be prepared--this is a rationale based on the philosophy and policy of the proponent organization.

4.2.4 Integration of Concepts. The formulation of concepts normally should go through several stages or iterations. "First draft" concepts should be exchanged among proponents for review. Minor or major revisions may be required, and it may be necessary to review and revise objectives at each level--up to the STOG--if major impact issues are identified.

Note, in Figure 4.2, that two levels of integration are indicated. Subsystem concepts for Personnel, Training, etc., are to be consolidated as "Support System Concepts," and Support, Materiel, and Doctrinal concepts are consolidated to form "Total System Concepts."

4.2.5 Responsibilities. TRADOC will initiate subsystem activities by assigning concept development responsibilities to the various support organizations. Training concept development will be assigned to a proponent school, and the school commandant will determine who, from his staff, will act as the training representative for a specific system.

The designated training representative at the assigned proponent school will have the following responsibilities:

a. Development of training concepts.

b. Coordination of training concept development with other interested schools.

c. Coordination of training concept development activities with CD, with other support system organizations (Personnel, Logistics, Organization), and with the Materiel Developer.

It is important that the training representative be provided with the resources to conduct these activities, and that he possess the capability (training, experience) required.

In addition, there is a need for a central point of coordination, within TRADOC, to oversee the integration of the various subsystem concepts. This coordination role will be assumed by the TSM, but must be fulfilled from some other quarter until his appointment.

4.2.6 Elements of the Training Concept. Generation of the training concept should involve a first iteration of the training developments model to: develop a preliminary task listing; identify the kinds of

personnel required to operate and maintain the proposed system; develop a preliminary outline of training required; and develop a preliminary outline of the training support system. It is important to note that, while concept development activities will normally be based on rather sketchy and incomplete information about the system, it is important that the products be as comprehensive and detailed as practicable. There are several reasons for comprehensiveness and detailed development--even at the risk of producing "low validity" products:

a. The concepts provide the basis for developing the training plan to be included in the LOA. Well developed, if tentative, products allow for better planning.

b. Costing.

c. Integration of training with other support subsystems can be facilitated by having more specific information to work with in examining the interactions between subsystems.

4.3 LETTER OF AGREEMENT

[Figures 4.3 and 4.3a about here]

4.3.1 TSM Appointment. At some point in the concept development stage, a decision will be made to proceed to the preparation of the LOA. It would be appropriate for a TSM office to be established following that decision, and that the first TSM task be the integration of support subsystem inputs to the LOA.

4.3.2 Definition and Rationale. The LOA is a jointly prepared Combat Developer (TRADOC), Materiel Developer (DARCOM) document that:

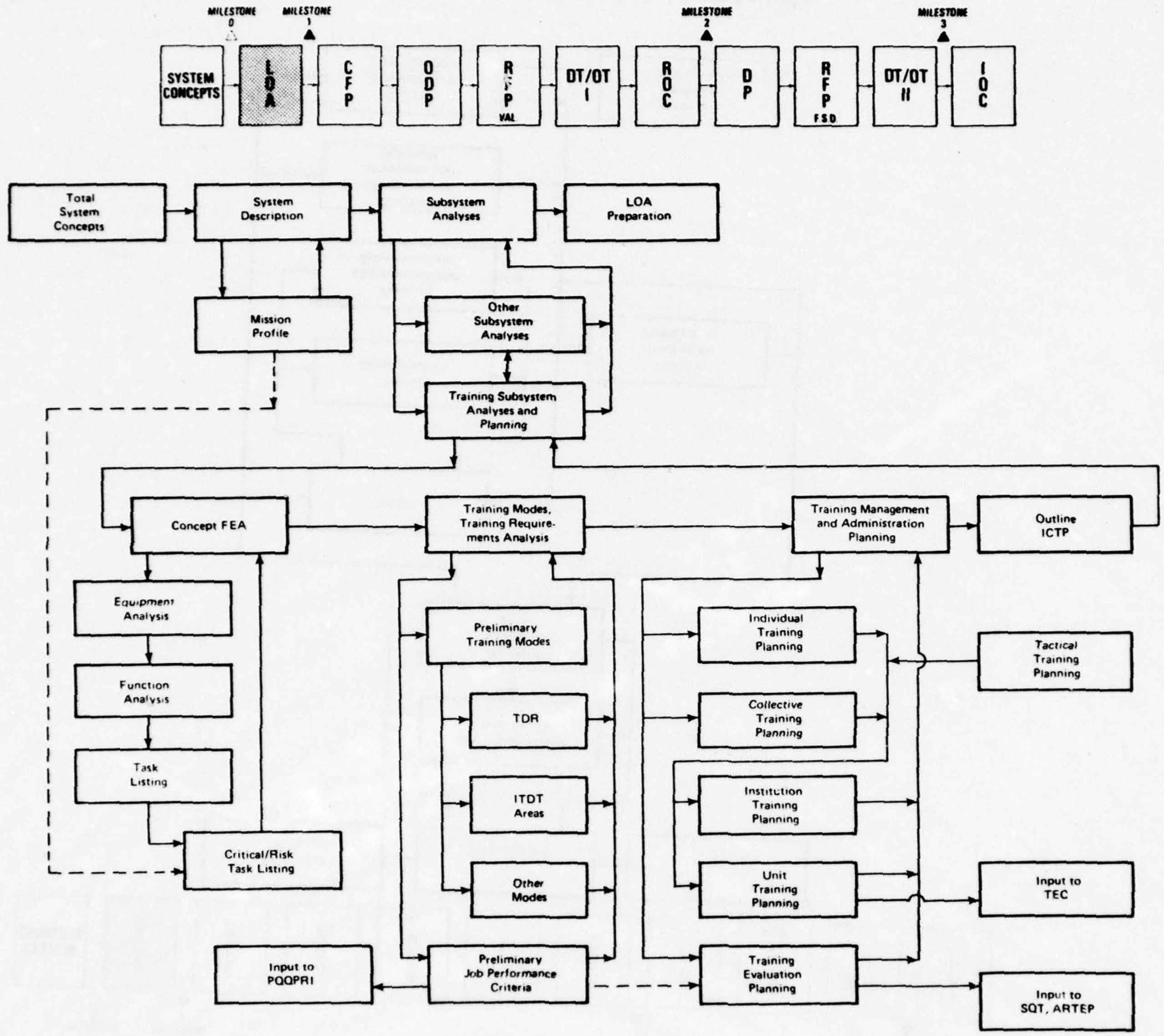

Figure 4.3. LOA

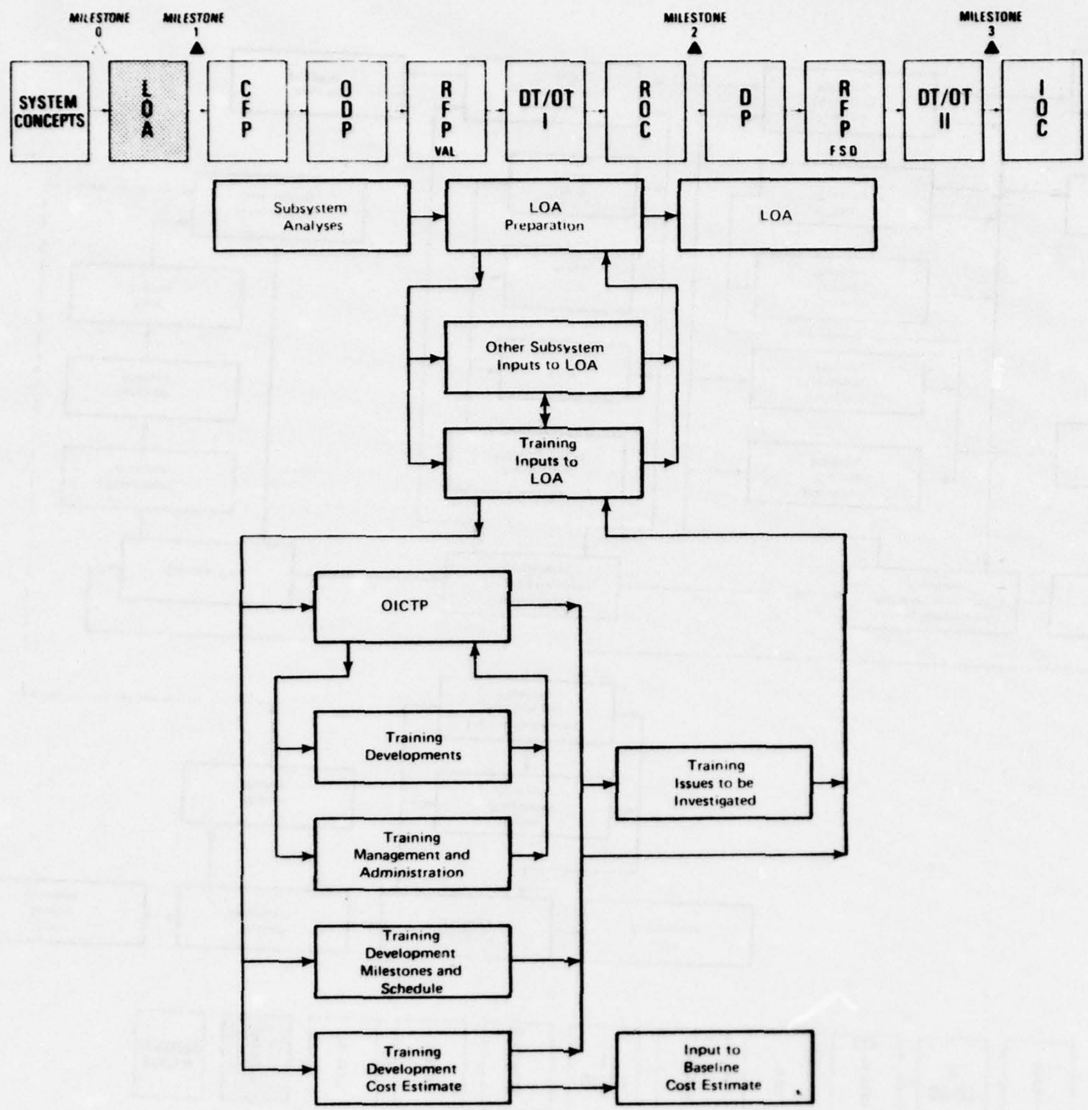

Figure 4.3a. LOA (continued)

a. Provides a record of the agreement between these developers to proceed with development.

b. States the issues to be resolved through study and investigation.

The LOA is the document of record to support effort in the system advanced development category of the RDTE program. Systems with substantial projected developmental costs require LOA action at HQDA level.

The LOA is a key document for establishing the direction and scope of the development effort. System concepts must be sufficiently developed to allow identification and definition of problems and issues to be resolved by STF/SSG. Concepts must also be "operationalized" to a degree that allows reasonable estimation of developmental costs.

Areas that have not undergone this preliminary development in the concept stage are likely to receive less than their share of the "developmental pie" and their constraints cannot be adequately considered in the early system design. Consequently, development of these areas will lag, possibly resulting in:

a. Failure to research and resolve critical system issues prior to the tradeoff determination and tradeoff analysis to select the BTA.

b. Failure to make provisions for needed work in the validation RFP, and subsequently, omission from the development contract.

c. Difficulty in providing issues and criteria for testing at DT/OT I.

Impact on total systems development is likely to be increased development time as these areas "catch up" later, and/or decreased system effectiveness if these areas do not meet their full capability goals.

4.3.3 Mission Critical/High Training Risk Tasks Listing. Figures 4.3 and 4.3a show three areas of activity culminating in training inputs to the LOA.

The first activity, emanating from the Total Systems Concepts is a reiteration of the Front End Analysis resulting in a revised Task List and from this list, a subset of "Mission Critical/High Training Risk Tasks." These Critical/Risk Tasks are to receive full training development during the validation phase, will be validated at DT I and demonstrated or verified in the total system context at OT I. The extent of analysis required here will be dependent upon the completeness of the work done in the concept generation stage and the degree of change and new information available following that work.

Close coordination with CD is required to identify the mission critical inputs to Critical/Risk Task selection. Behavioral analysis will be required to input the training risk component.

4.3.4 Outline Individual/Collective Training Plan (OICTP). The second activity is the development of a preliminary training plan. The "technical" part of this plan is concerned with specifying the content of training, the modes for learning, and training objectives and job performance criteria. Close coordination is required with logistics and personnel developers to incorporate ITDT requirements and to ensure correspondence between personnel input capabilities and training and job performance objectives.

The second part of this activity is the development of a management and administration plan describing how and where training is to be done, and identification of the resources required to support the training effort. If tactical training development occurs apart from the main training development, it should be included as a separate input. Note also that Training Evaluation has been included in the OICTP. This evaluation activity deals with the ongoing, internal evaluation of the training process (e.g., ARTEP, SQT) and is not to be confused with the formative evaluation and testing of training development which becomes part of the coordinated test programs for DT and OT.

4.3.5 Training Inputs to LOA. The third activity is the preparation of inputs to the LOA. These inputs include:

a. A description of the proposed training subsystem, including training developments required, and the training management and administration system.

b. A description of issues and recommendations for studies required to lead to their resolution.

c. An estimation of training development costs, broken down by major area. This costing will also feed the BCE.

d. A training development schedule.

4.3.6 Responsibilities. The Combat Developer (TRADOC) is responsible for preparation of LOA with input and coordination from the Materiel Developer and Logistician. Assuming the prior existence of the TSM office, the responsibility for this activity should reside in that office.

4.4 CONCEPT FORMULATION PACKAGE

[Figure 4.4 about here]

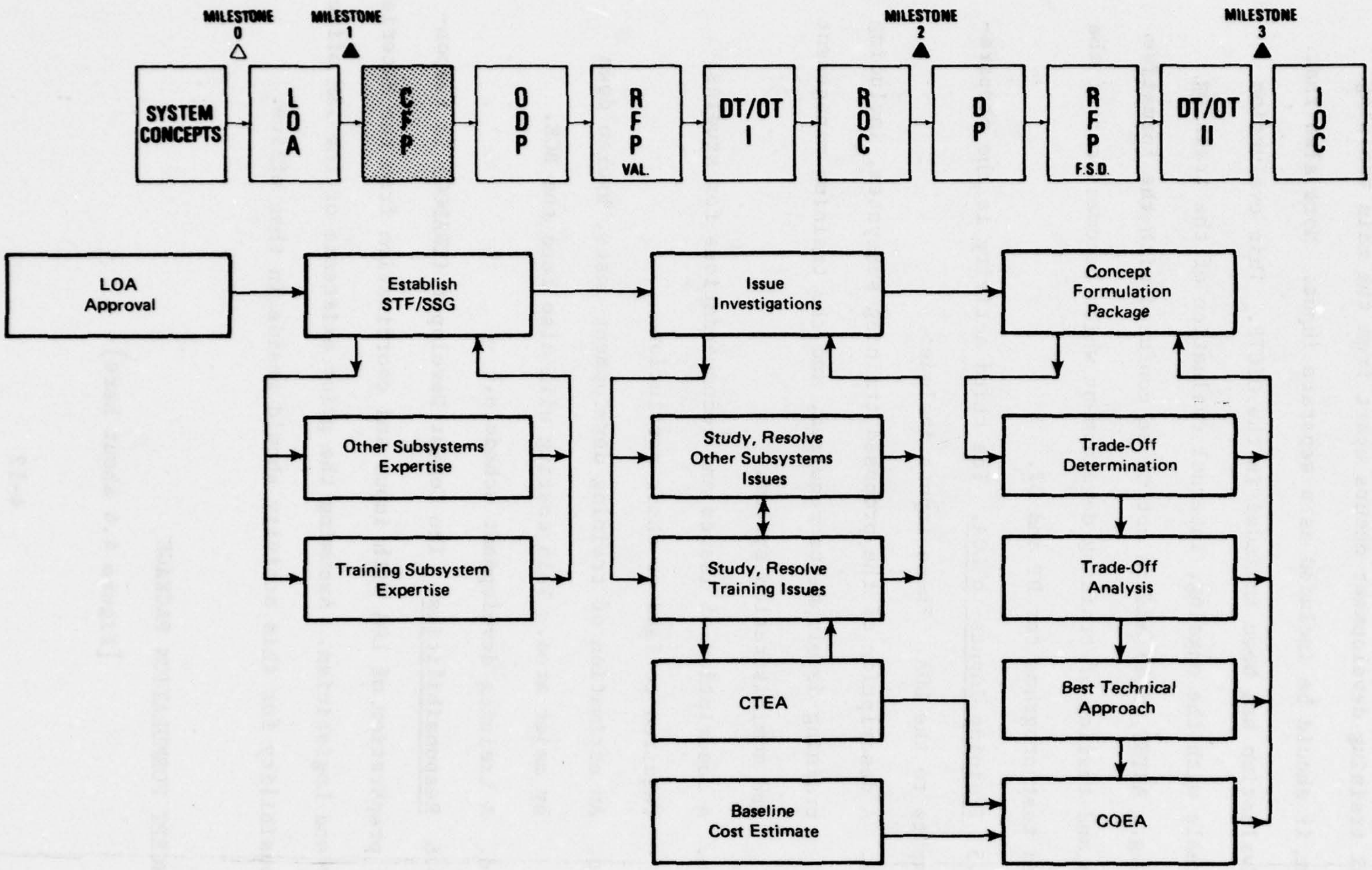

Figure 4.4. CFP

4.4.1 Definition. CFP can best be characterized as a period of study and analysis to more fully determine the system potential and to identify the approaches to system development most likely to optimize this potential. The CFP begins with approval of the LOA and the establishment of a STF and SSG and concludes with preparation of the CFP document containing results of the analyses to select the best technical approach (BTA), and a COEA.

4.4.2 Special Study Group/Special Task Force. A STF or SSG may be established as part of the LOA approval process. Responsibilities of the STF/SSG may be limited to conducting pre-specified investigations or may be extensive, to include further development of the LOA and/or conduct of TOD/TOA/BTA and preparation of the CFP.

Composition of a SSG is determined by CG TRADOC. It is important that qualified representatives from each activity be identified and included on the STF/SSG, and normally it is expected that the TSM be a member.

4.4.3 Issue Investigation. Issues relating to training development may concern training development technology, capabilities for training support, or special skill and knowledge requirements. Special studies may be required to develop data for costing training materials (e.g., ITDT), expendables (e.g., training ammunition) or training devices.

4.4.4 Best Technical Approach. The analyses and investigation leading to the BTA determination are intended to reduce the number of system and subsystem alternatives for preliminary development to a manageable level. The validity of this process is determined by the information available at the time these decisions must be made. A lack of information means that decisions, which must be made, will be arrived at arbitrarily.

The amount of effort required during CFP will depend on:

a. The number of alternatives under consideration.

b. The number and extent of issues to be investigated.

Costing and cost/effectiveness analysis are intended to play a major role in the CFP. The BCE is revised and updated (COEA). A CTEA should be one element feeding the COEA.

4.4.5 <u>Responsibilities.</u> Responsibility for preparing the CFP and the activities leading to this document will vary according to the responsibilities assigned to STF/SSG. A TSM would normally be a member of a STF or SSG, and possibly should chair a SSG. The TSM should participate in identifying members of a STF/SSG to ensure appropriate support subsystems representation.

4.5 OUTLINE DEVELOPMENT PLAN

[Figure 4.5 about here]

4.5.1 <u>Definition</u>. ODP is the planning activity following selection of BTA to be pursued in validation development. ODP results in a planning document which provides the requirements for development activity.

The analyses carried out during CFP should provide new detailed information for those systems and subsystem alternatives selected for validation development. Planning for training development is shown as occurring in three areas:

a. Updating training development requirements.

b. Updating the Outline Individual/Collective Training Plan.

c. Preparing the Training Testing Plan.

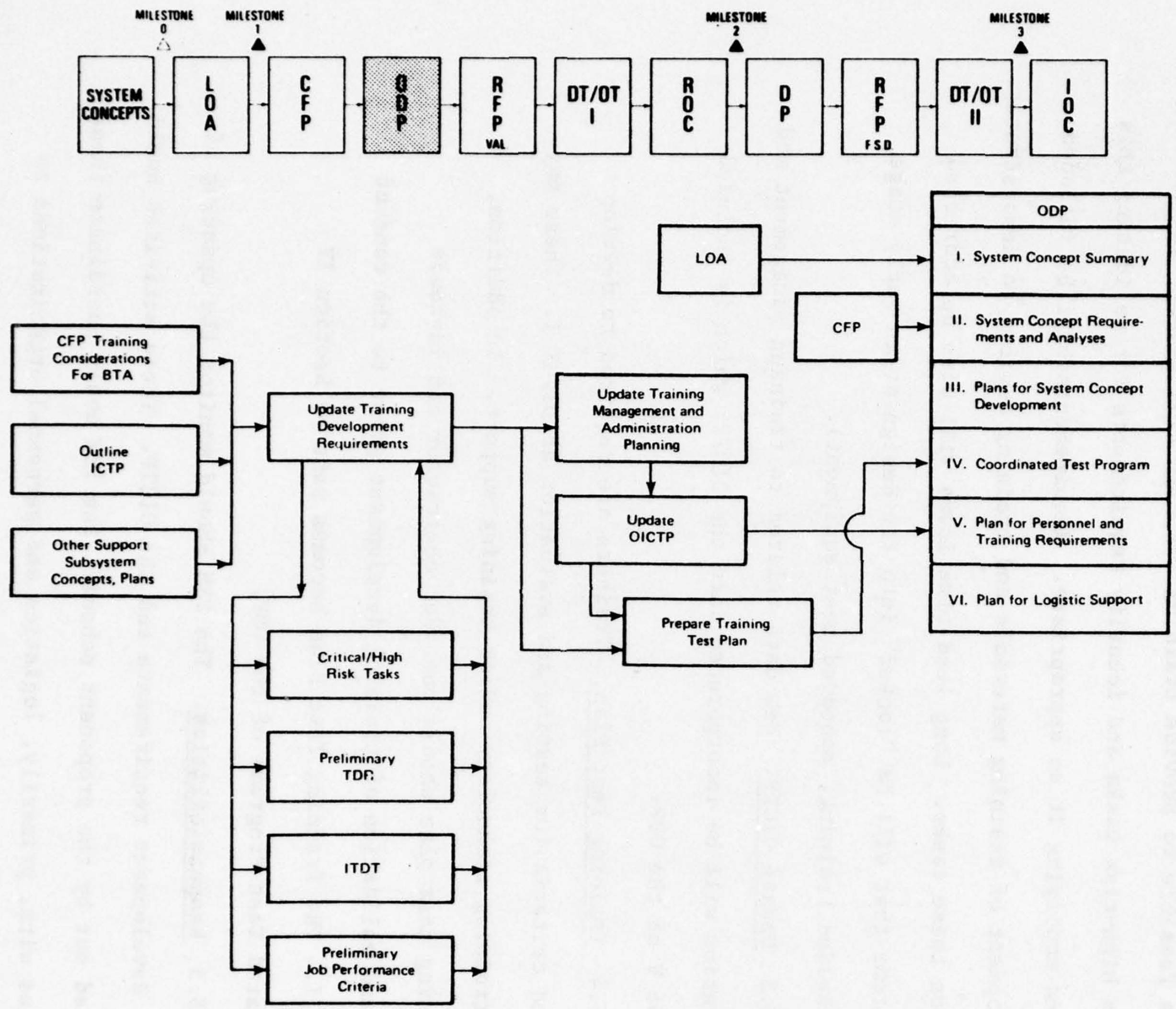

Figure 4.5. ODP

4.5.2 Training Development Requirements. The primary emphasis for training development during the Validation Phase will be to determine that it is feasible to provide training for high-risk tasks. The ODP will list known high-risk tasks and identify requirements for validating this listing and modifying it as appropriate. Requirements will be included for development of training materials and training devices to demonstrate training on these tasks. Long lead time items will also be addressed as will items that will be "locked" into the design at an early stage (e.g., embedded training, embedded test equipment).

4.5.3 Update OICTP. New data related to training management and administration will be incorporated into the OICTP, which is included in Section V of the ODP.

4.5.4 Training Test Plan. Trainers are required to develop issues and criteria for testing and evaluation at DT/OT I. These may concern training technology and/or training support. In addition, the training test plan should consider contractor and in-house testing and validation of training development prior to the conduct of DT/OT I. The Training Test Plan becomes part of Section IV (Coordinated Test Program) of the ODP.

4.5.5 Responsibilities. The TSM should monitor the updating of training development requirements and the OICTP. These activites would be carried out by the proponent school. The TSM would coordinate these activities with, primarily, logistics and personnel organizations to ensure correspondence between task requirements and training, and personnel capabilities and training. Close coordination with training device developers will also be required.

A representative from the TSM office should be included in the JWG for testing.

4.6 RFP, VALIDATION

[Figure 4.6 about here]

4.6.1 Definition. RFP Validation includes the activities required to prepare specifications for the RFP, evaluate proposals and select contractors, and to monitor contractor work to provide the products for DT/OT I.

4.6.2 Specifications for Training Development and Validation. Specifications for training development are derived from the requirements described in the ODP, and describe the work to be accomplished by the developmental contractors.

Training developments are to occur on two levels during the validation phase:

a. Training materials and ITDT are to be provided at DT/OT I for high-risk tasks.

b. Analyses and training requirements for other (low risk) tasks will proceed sufficiently to provide operator/maintainer capabilities for DT/OT I.

Also, long lead time, expensive components (e.g., simulators) are to be developed and provided (in at least "breadboard" form) for DT/OT I, as are embedded test equipment and embedded training.

A key to the scope of work required during validation development is the accuracy of the high-risk task list provided in the specifications. Provisions must be made for revision of this list early in the contract stage as the contractor FEA proceeds.

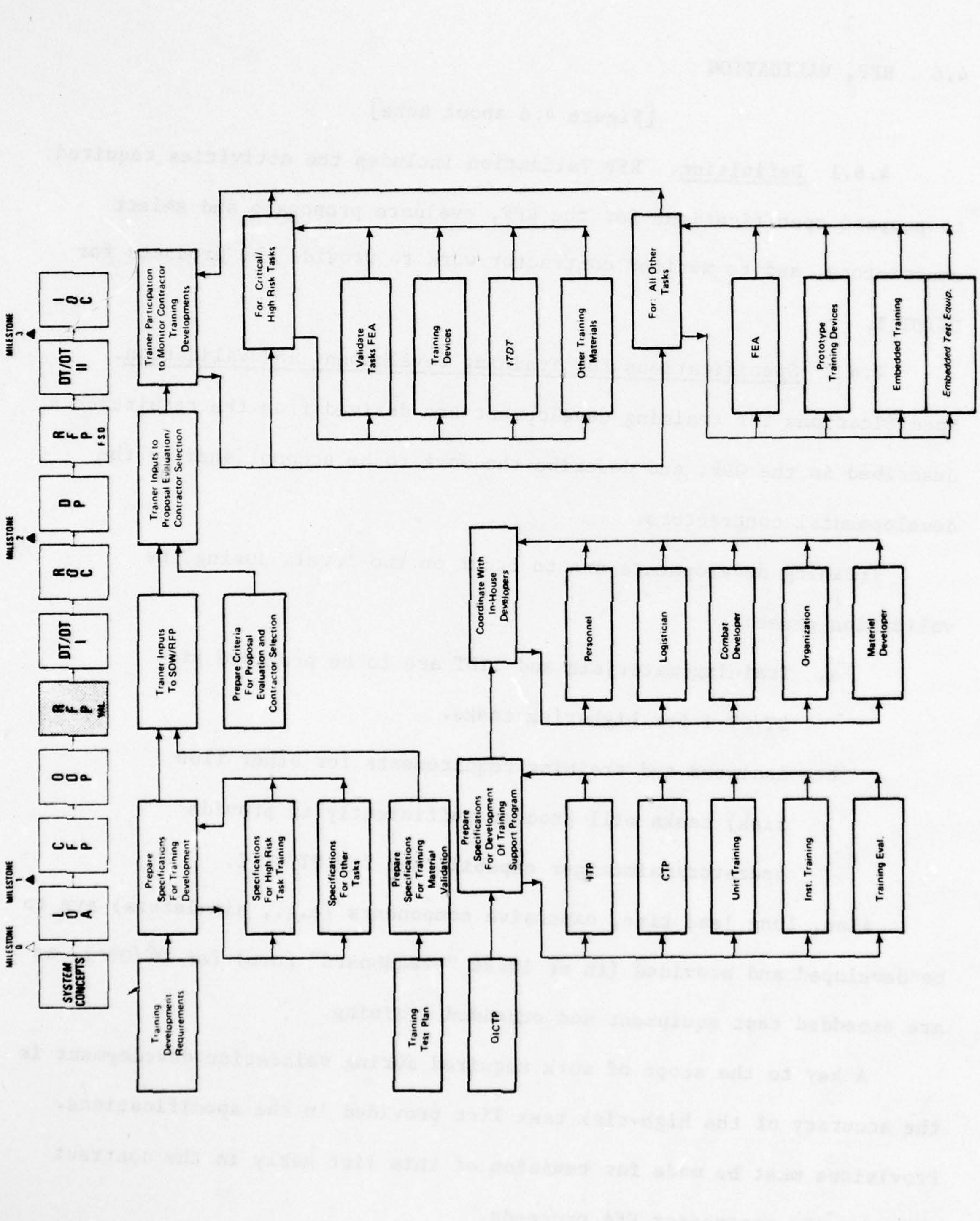

Figure 4.6. RFP, Validation

The role of DT/OT I is primarily to ensure that developmental products have achieved their stated goals. The "increased emphasis on testing" indicates that provisions be built into the developmental cycle to ensure thorough validation of individual products prior to their submission for overall system operational testing. There are well established procedures and facilities (i.e., proving grounds, labs) for DT of hardware components. Apparently the same capability does not exist for testing and evaluating other subsystems. Therefore, procedures should be developed and resources identified as part of the developmental effort. Test and validation requirements that are to be met by the contractor should be made part of the trainer input to the RFP.

4.6.3 Specifications for Training Support. Specifications for development of the OICTP should be prepared. Although this is mainly an in-house activity, the OICTP is a "product" to be evaluated at DT/OT I and the specifications for its development will enable the parties responsible for ensuring its development to monitor its progress during development.

4.6.4 Proposal Evaluation/Contractor Selection. Training (and other support subsystem) developers should play an active role in the evaluation of proposals and should make recommendations for contractor selection based on the quality of the proposal and qualifications of contractor personnel to perform the FEA and training developments. Criteria for proposal evaluation should be prepared.

4.6.5 Monitor Developmental Efforts. Following contract award, close coordination with the contractor will be required to:

a. Ensure the contractor is included in the flow of information.

b. Monitor progress of developmental activites.

c. Participate in validation and verification of products. Although overall contract responsibilities reside with the materiel developer, it should be a TSM function to provide quality assurance monitoring for training developments, and he should have a least joint "sign-off" authority over training development products.

4.6.6 Responsibilities. The materiel developer has overall responsibility for preparation of the RFP, contract award and monitoring of developmental contracts.

The TSM should be responsible for and have joint sign-off authority for training developments and other support subsystem inputs to the RFP. Preparation of specifications should be done by the proponent organizations (e.g., proponent school). The TSM should review specifications to ensure their completeness before submitting them to the materiel developer. Specifications for FEA and ITDT must be coordinated with the logistics proponent, training device specifications coordinated with the training device developer, and specifications for embedded training and test equipment coordinated with the materiel developer.

The TSM should have responsibility for developing "in-house" specifications for the OICTP and for validation and verification of developmental products.

As discussed above, the TSM should establish, through the materiel developer, a liaison relationship with the training development contractor.

4.7 TESTING, DTI AND OTI

[Figure 4.7 about here]

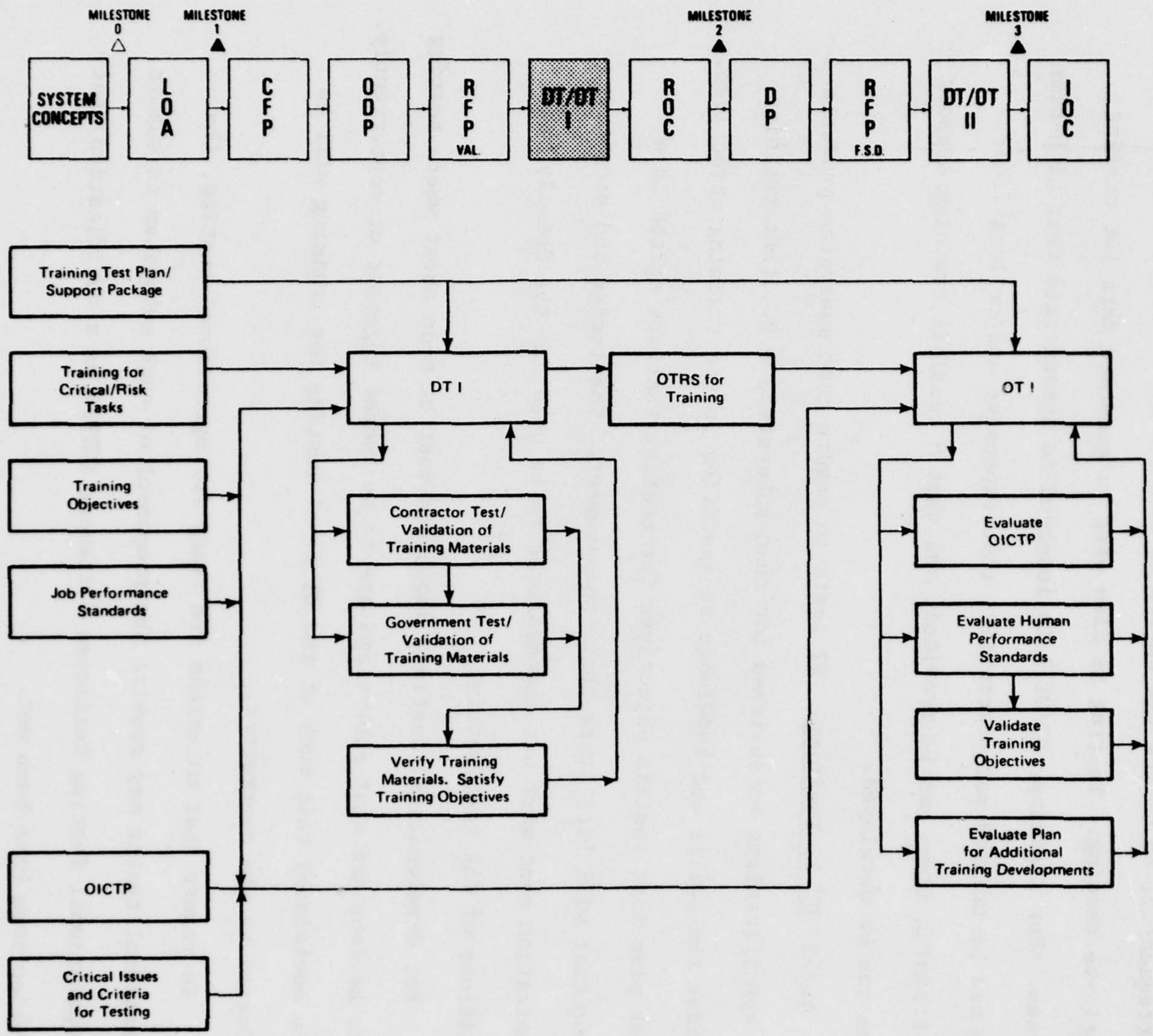

Figure 4.7. DT/OT I

4.7.1 Definition. Development and Operational Testing during the validation are intended to prove the feasibility of the system concepts and, frequently, to narrow the choice of alternative concepts through competitive testing. Testing is also used to generate data for costing purposes. For Training, DT/OT I is intended to demonstrate that high-risk tasks can be trained satisfactorily, that expensive and/or long lead-time training items can be provided, and that a feasible training support system can be developed.

4.7.2 DT I, Training. DT tests to ensure that subsystem products meet specifications established for that subsystem, e.g., that training provides the skills and knowledge as specified in the training objectives. A test plan must contain objectives for testing that are stated in a manner that will facilitate their measurement. The tester and proponent organization must work out the measures to be used and the details and conditions of the test setting.

For developmental testing, decisions must be made about where testing is to be done and what subsystems are to be tested together or concurrently. It is envisioned that much of the DT level testing for training will be conducted by the contractor.

To ensure that materiels are ready for operational testing, the operational tester may require the proponent of each subsystem to submit an Operational Testing Readiness Statement (OTRS) as a verification that DT objectives have been met.

4.7.3 OT I, Training. OT I should evaluate the feasibility of the "training concept" as it is described in the OICTP. OT I should also include studies to ensure that training objectives, to which training materials are geared, are valid, i.e., that individuals trained to the

objectives can perform at a level consistent with system needs. Other OT I training concerns may include: studies to generate data for CTEA/COEA, and evaluation of plans for continued training development.

4.7.4 Responsibilities. The Materiel Developer and Operational Tester, respectively, are responsible for the conduct of DT and OT. The proponent for each subsystem is responsible for making inputs to the Coordinated Test Program for their area (Criteria and Issues for Testing). As support subsystem testing has not been emphasized in the past, and the capability for testing is not well developed, subsystem proponents should take an active role in the development of criterion measures and the design of test settings. For training, and other support subsystems, the TSM should be responsible for ensuring that issues and criteria for testing are developed and supplied to the appropriate tester, and should ensure that test situations include support subsystem components.

TSM should also monitor development activities (both contractor and in-house) to ensure that validation and verification testing occurs as required. The TSM should also be responsible for obtaining the signoff on the OTRS for training prior to Operational Testing.

4.8 REQUIRED OPERATIONAL CAPABILITY

[Figure 4.8 about here]

4.8.1 Definition. Analysis of the results of testing leads to a recommendation for the development of one system from the alternatives tested at DT/OT I. The ROC activity updates system operational criteria, describes the system that will meet these criteria, describes the work required to develop that system, and updates acquisition and life cycle cost estimates.

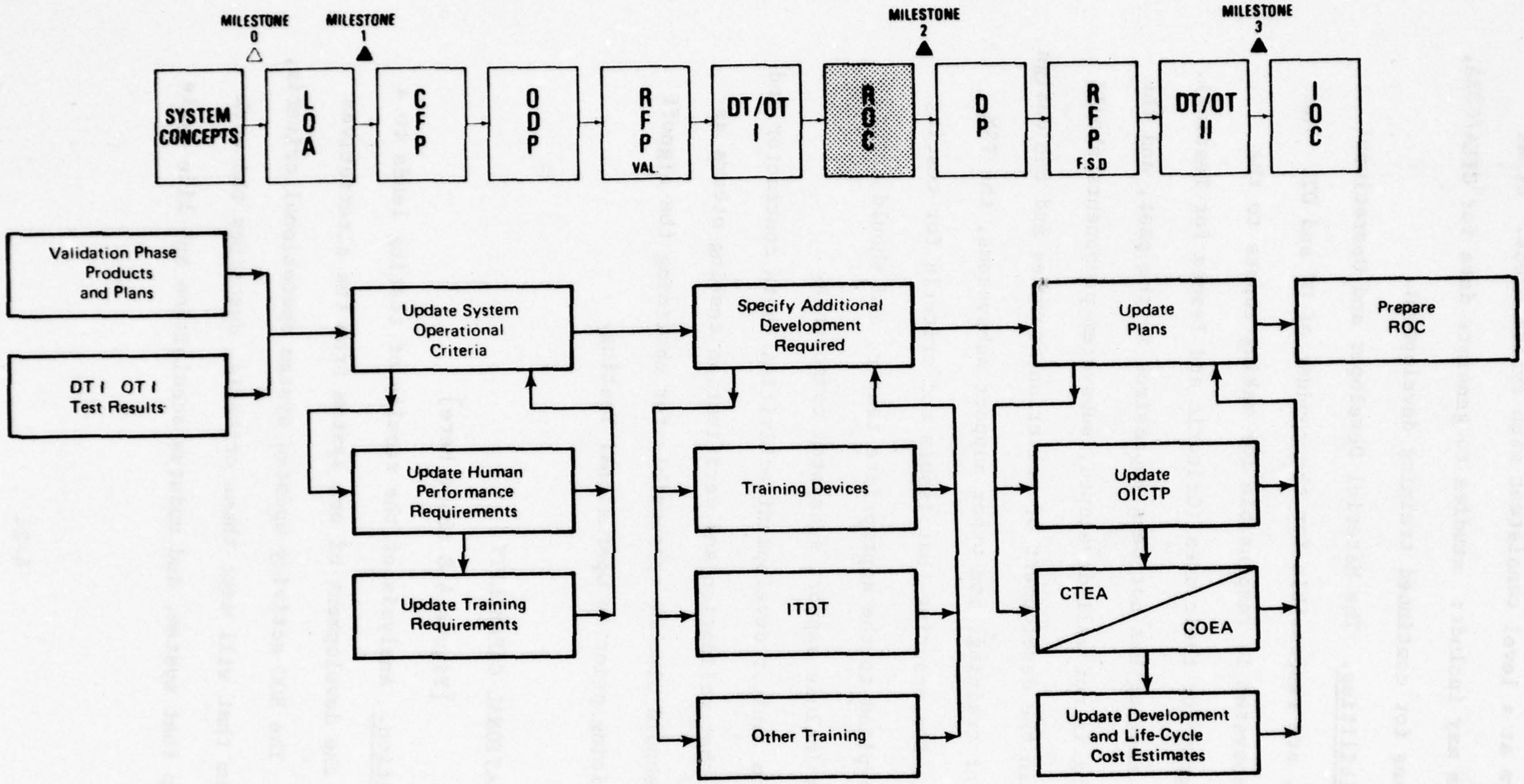

Figure 4.8. ROC

Movement from the Validation Phase to the Full-Scale Development Phase implies that major issues have been resolved and the concept validated. The updating of operational criteria should be mainly a refinement of existing criteria.

4.8.2 Update Training Requirements. Refinement of System Operational Criteria may cause modification to human performance requirements and training requirements. Changes to system criteria should be carefully reviewed by training developers to ensure that job performance and training requirements are in full agreement with these higher level criteria.

4.8.3 Additional Training Developments. Training development will refocus from high-risk tasks to the development of the total training subsystem. This will require development of low-risk task training materials, and integration of high-risk training materials into a total training package. Tactical training should also be merged into this package. TDRs for System and/or Non-System Devices are prepared and, if appropriate, a separate ROC for these devices developed.

4.8.4 Update OICTP. The OICTP must be refined and expanded with more detail generated during validation development and testing. Training development cost estimates are updated and life cycle training cost estimates generated. While the ROC document is succinct and brief, it requires extensive supporting documentation.

4.8.5 Responsibilities. The main purpose of the ROC is to provide the information required to determine the potential of a system in terms of operational capability and the cost of this capability. It is the responsibility of each subsystem proponent to develop the data for his area that will allow reasonable judgments to be made on these parameters.

TSM responsibilities should include:

a. Ensure performance standards and training objectives are updated.

b. Ensure OICTP updated and in sufficient detail to allow reasonable life cycle costing.

c. Ensure these data are provided to organizations responsible for preparing cost estimates.

4.9 DEVELOPMENT PLAN

[Figure 4.9 about here]

4.9.1 Definition. Following ROC approval the ODP is updated and becomes the Development Plan (DP). A STF/SSG may be established (or reconvened) to resolve any remaining system issues. The DP is to include full specifications for the remaining system development, including all items of support.

4.9.2 Training Plan Development. A plan will be prepared for the development and acquisition of all training materials, training devices and training aids required for institution and unit training. This plan will also provide for the development of all supporting documentation not included in ITDT.

The OICTP will be updated to become the ICTP. It will describe full plans for individual and collective training at both institution and unit levels. A training "start-up" and implementation plan will be developed to phase in the training for the new system. NET will be a key element of this plan. NET will be the primary means, for most systems, for establishing the training capability at the unit training level.

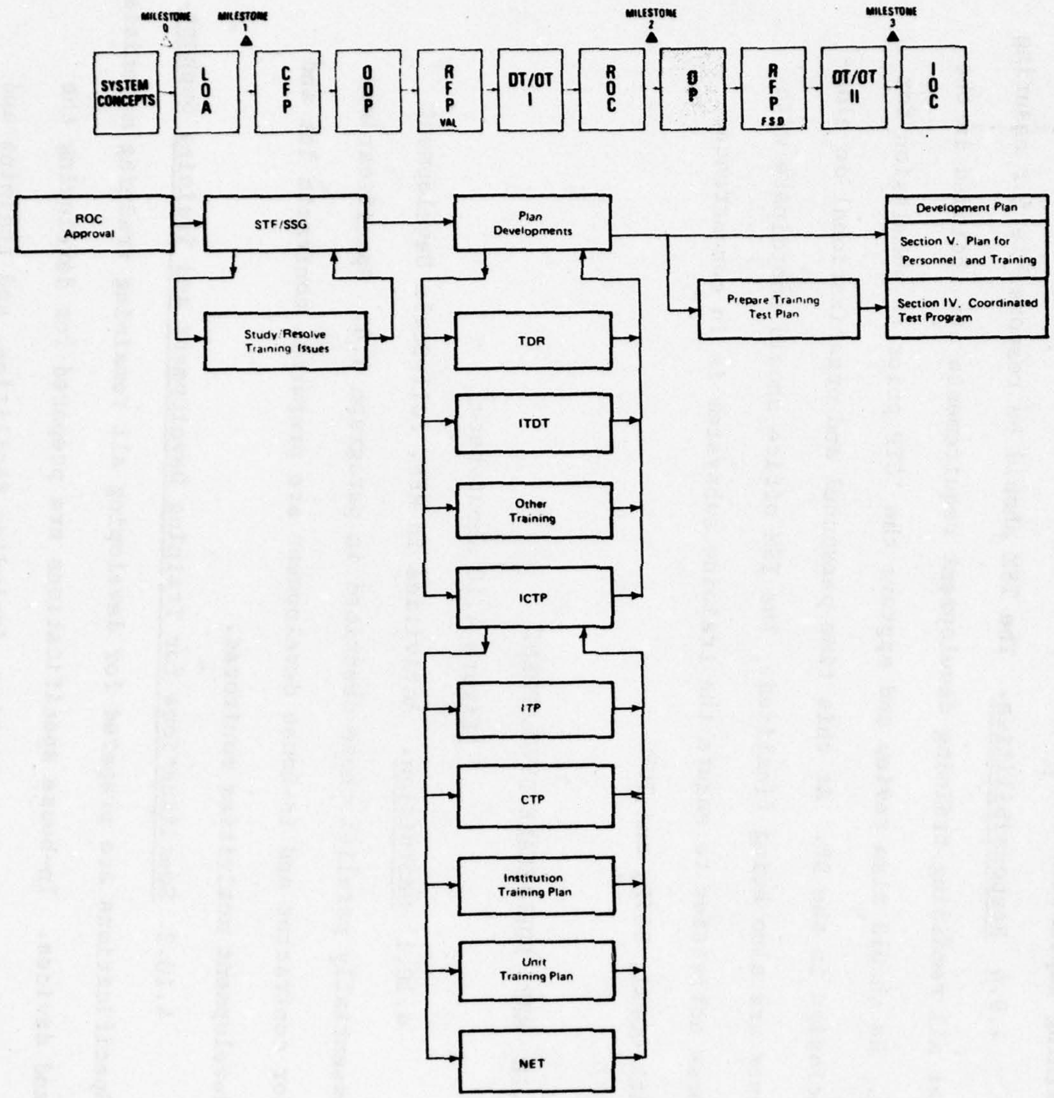
MILESTONE 0
MILESTONE 1
MILESTONE 2
MILESTONE 3
SYSTEM CONCEPTS
LOA
CFP
ODP
RFP VAL
DT/OT I
ROC
DP
RFP FSD
DT/OT II
IOC
ROC Approval
STF/SSG
Study/Resolve Training Issues
Plan Developments
TDR
ITDT
Other Training
ICTP
ITP
CTP
Institution Training Plan
Unit Training Plan
NET
Prepare Training Test Plan
Development Plan
Section V. Plan for Personnel and Training
Section IV. Coordinated Test Program

Figure 4.9. DP

4.9.3 Training Test Plan. The test plan will cover contractor and government testing and validation of training materials, evaluation of the training implementation plan, and training support for DT/OT II testing.

4.9.4 Responsibilities. The TSM should be responsible for ensuring that all remaining training development requirements are included in the DP. He should also review and approve the ICTP prior to submission for inclusion in the DP. At this time personnel and organizational developments are also being finalized. The TSM office should coordinate with these activities to ensure the training subsystem is in concurrence with QQPRI, BOIP, and TOE.

4.10 RFP, FULL-SCALE DEVELOPMENT

[Figure 4.10 about here]

4.10.1 Definition. Activities in RFP, Full-Scale Development essentially parallel those described in paragraph 4.6. Specifications for contractor and in-house development are prepared, contracts let and development activities monitored.

4.10.2 Specifications for Training Development and Training Support. Specifications are prepared for developing all remaining training materials and devices. In-house specifications are prepared for developing the training support organization, including facilities, and training and training support personnel. Specifications are developed for activities to establish and schedule NET to ensure the field training capability is installed prior to IOC.

4.10.3 Responsibilities. The TSM should review all proposed training development inputs to the RFP to ensure specifcations cover all required developmental activities. TSM should supply criteria for

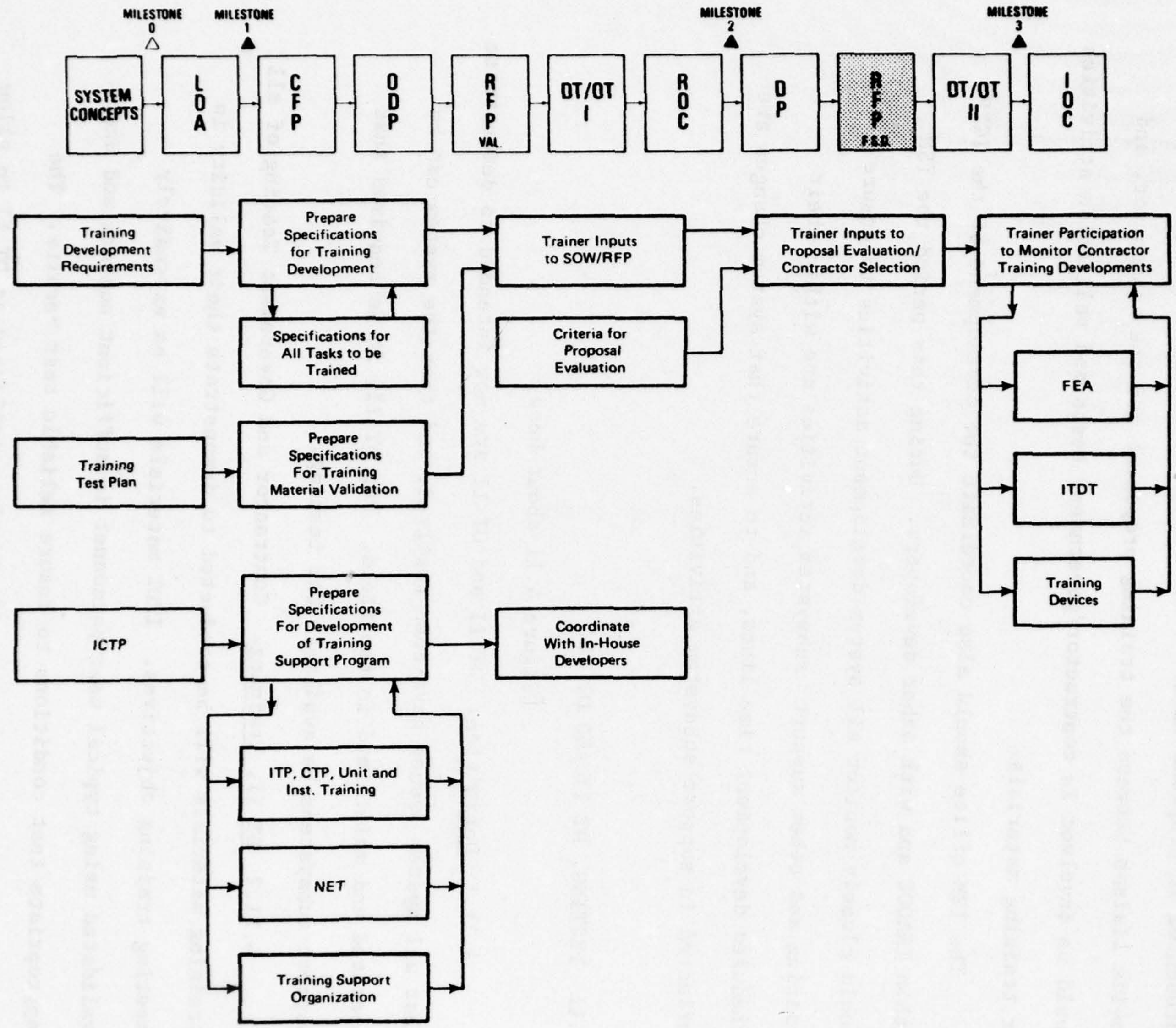

Figure 4.10. RFP, Full-Scale Development

proposal evaluation and ensure that training development interests are represented in proposal review and contractor selection. TSM should provide liaison between the training proponent and the contractor, and should be involved in contractor/government tests and validation activities for training materials.

The TSM office should also coordinate the development of the ICTP within TRADOC and with other developers. During this period the TSM should closely monitor all system development activities to ensure training and other support subsystem activities are within their scheduled development time lines, and to ensure that system changes are reflected in support subsystem activities.

4.11 TESTING, DT II AND OT II

[Figure 4.11 about here]

4.11.1 Definition. DT II and OT II are now intended to demonstrate that all system issues have been resolved, and that the system can be operated and maintained in the field. For OT II, it is required that support subsystems be available for testing.

4.11.2 DT II, Training. Contractor and Government Testing of all training materials will be conducted to demonstrate their validity in meeting training objectives. ITDT materials will be extensively validated using typical user personnel in sufficient numbers and under appropriate test conditions to ensure reliable test results. The training capability will be sufficiently established at DT II to allow testing of the training process, including instructional systems, training devices, and documentation, and NET. As feasible, the "exercising" of this capability will provide trained player personnel for OT II.

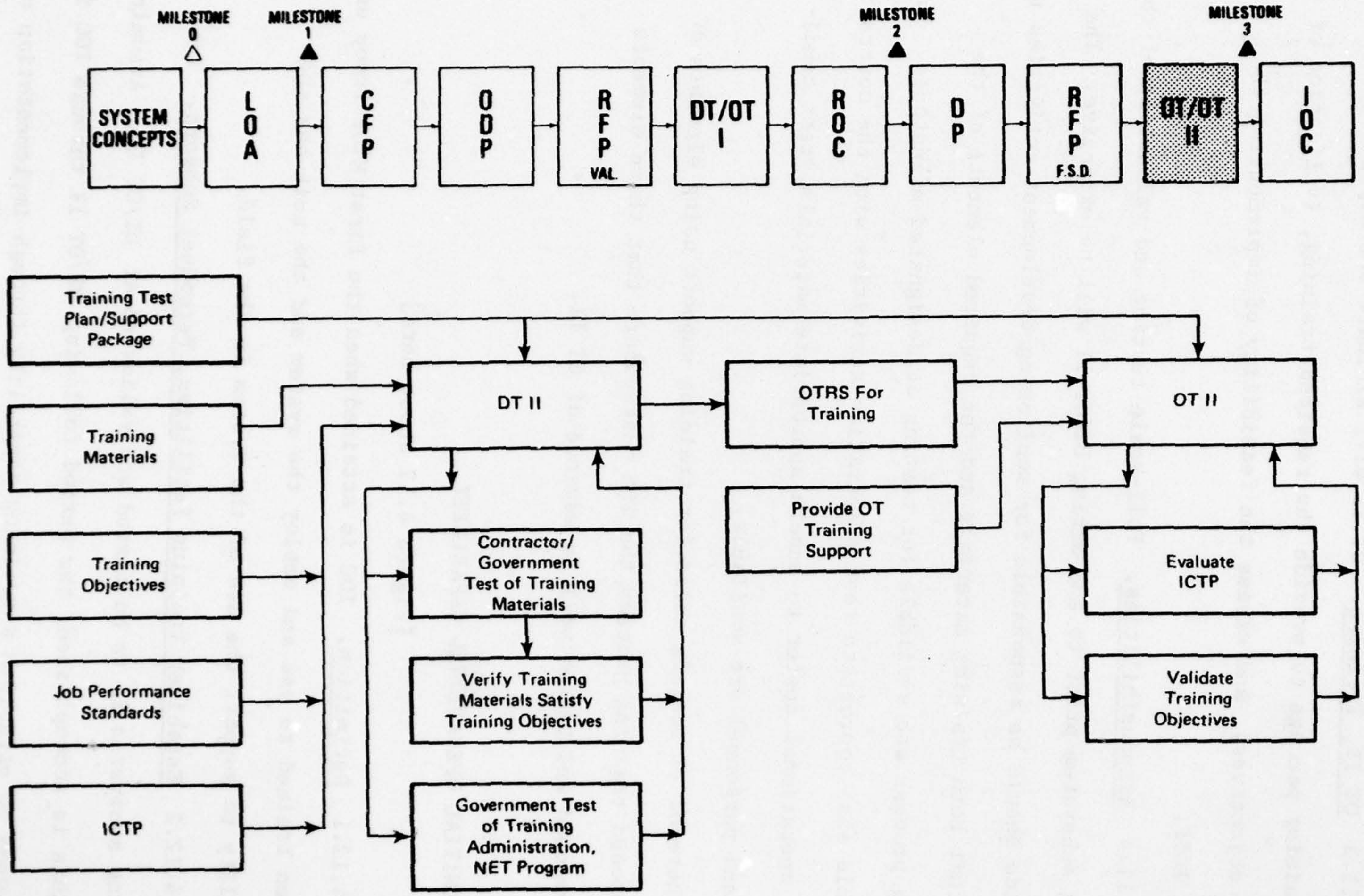

Figure 4.11. DT/OT II

4.11.3 OT II, Training. OT II will evaluate the capability of the total training package to provide the required training, (validation of training objectives), and assess the feasibility of implementing the proposed ICTP.

4.11.4 Responsibilities. Full-scale testing and validation of the training subsystem prior to and during DT/OT II will be extensive. The TSM office should be responsible for monitoring development activities to ensure that both training materials and the required elements of the training process are available for testing at designated milestones. The TSM should also coordinate test preparation activities with the contractor and the operational tester to ensure appropriate materials, test conditions, and personnel are available.

Where OT II testing calls for training support using elements of the proposed training process, the TSM must ensure that these elements are developed and tested well in advance of OT II.

4.12 INITIAL OPERATIONAL CAPABILITY

[Figure 4.12 about here]

4.12.1 Definition. IOC is attained when the first MTOE troop unit has been trained to use and employ the system and the unit has the capability to support the use of the system in the field.

4.12.2 Establish Training Facilities, Personnel Support. The training subsystem is to be tested and validated at DT/OT II. Assuming that this is accomplished, the period following DT/OT II through IOC is to be used to establish a training capability through implementation of the ICTP. Training subsystem activities will include:

a. Modifying and establishing training facilities.

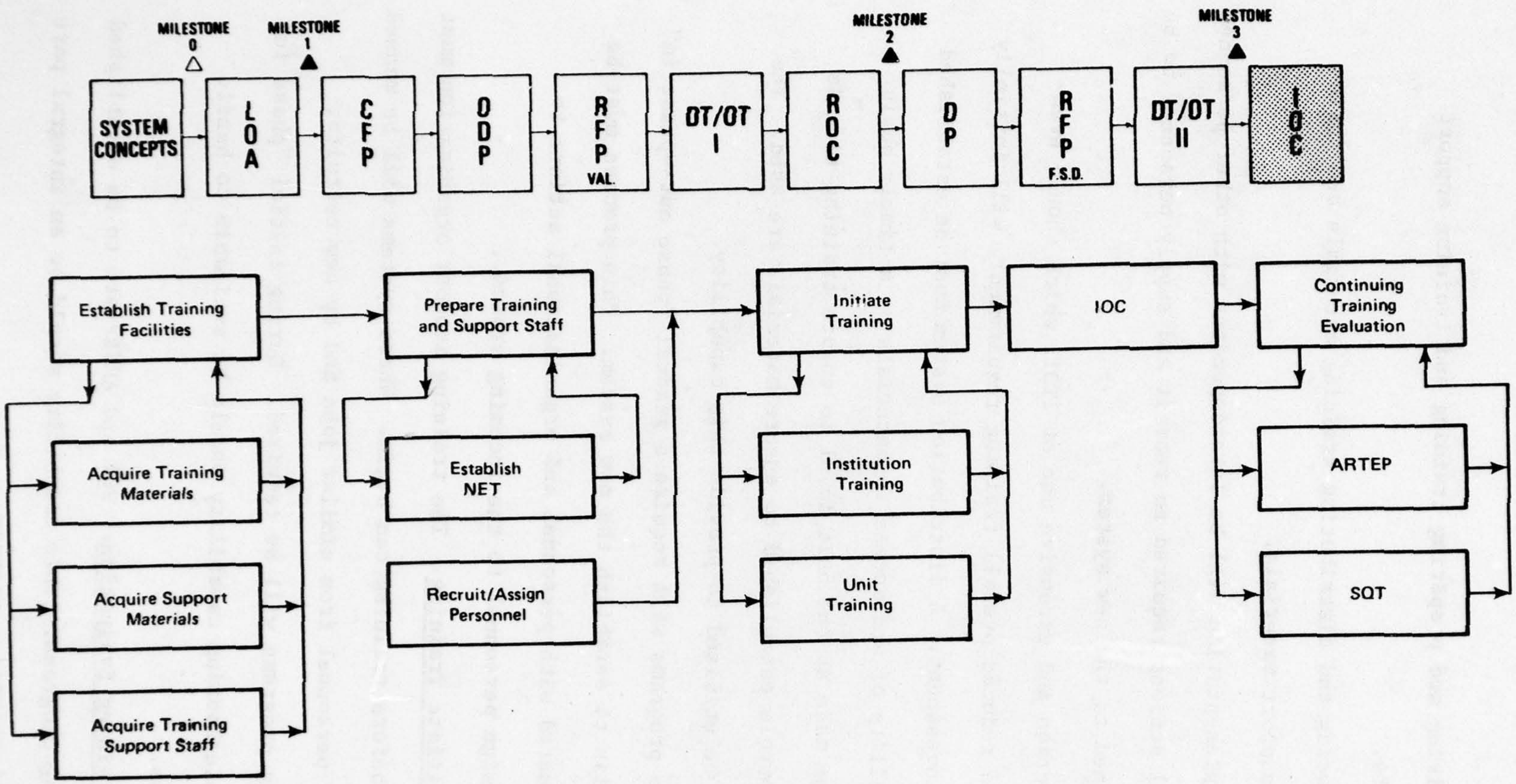

Figure 4.12. IOC

b. Acquiring and preparing training and training support staffs.

c. Producing and distributing training materials and training support materials.

Training implementation will be interdependent with other personnel and organizational actions required to recruit and supply personnel to be trained and assigned to the new system.

The introduction and extensive use of ITDT, which should eventually result in a reduced overall training requirement, will initially require a heavy investment. A distribution system must be established to ensure availability of and access to materials on a timely basis. Provisions must be made at the unit level to ensure training time is available and controls established to ensure materials are used. The NET program will be utilized to provide this capability.

Large scale programs will require a gradual "phase out--phase in" implementation plan to establish the new system. This process must be carefully coordinated with personnel and organizational actions to recruit and reassign personnel to the incoming system..

4.12.3 Initiate Training. The training support organization must be in existence before training can begin. Where systems will be manned both by transfer personnel from similar jobs and by new recruits, separate training programs will be required. During initial "phase in" training a troubleshooting capability should be available to handle start-up problems.

4.12.4 Training Evaluation. SQT and ARTEP are to be established with new training programs. This capability should be an integral part of the total implementation program.

4.12.5 Responsibilities. During the early implementation stage, the TSM should be responsible for tracking the acquisition of facilities and materials, and should act as coordinator between NET and the user organizations for the development of the training and support staff.

The TSM should also track personnel and organizational actions that are to provide operator and maintenance personnel to the new system. As the system is introduced, the TSM should ensure the introduction of the Training Evaluation Activity.

APPENDIX A

SYNOPSIS (FOR TRAINING) OF AR 1000-1

CHAPTER 1

GENERAL

1.1 Purpose. This regulation establishes basic Army Policy for acquisition of materiel systems and, together with AR 15-14, implements DOD Directives 5000.1 and 5000.2.

1.2 Applicability and Scope.

a. The general principles of this regulation apply to the development and acquisition of all Army materiel systems. . . . . The term "materiel system" refers to a major end item, all components, subsystems, and ordnance essential to its operational employment, plus its complete system support package.

b. This regulation describes the system acquisition process in detail for major systems from initiation (identification of a mission need) through successful completion of development, production, and deployment.

CHAPTER 2

MATERIEL ACQUISITION POLICY

2.1 Decision-Making Levels

a. (1) Materiel programs involving anticipated cost of $75 million in RTDE or $300 million in procurement appropriations will be considered for designation as major system acquisition programs.

(3) The Mission Element Need Statement (MENS) will be used to describe the mission and to justify the initiation of a new major system acquisition (see AR 71-9).

2.3 Technology Base

a. Long-range research objectives will be defined by science and technology objectives (STO). A compendium of STO will be published in the Science and Technology Objectives Guide (STOG). STO will be formulated by the user representative (usually TRADOC) and will be processed in a manner similar to that for ROC.

2.4 Project Management

a. After approval of the MENS at Milestone 0, a Special Task Force (STF) or Special Study Group (SSG) will be formed to conduct the exploration of alternative system concepts. The director of the STF or SSG will manage the program between Milestone 0 and I.

b. When a system(s) has been identified, at Milestone I, for demonstration and validation, a project manager (PM) will be assigned for all major systems.

j. The PM will ensure that ILS requirements are taken into account at all stages of system development and that system support planning proceeds in phase with system development and procurement.

l. The PM will participate, as necessary, with the development tester, operational tester, combat developer, logistician, and other materiel development agencies in all aspects of testing.

m. The PM will participate with TRADOC in developing costing, scheduling, and logistical data as required to support cost and operational effectiveness analyses (COEA).

2.5 TRADOC Systems Management

a. For major systems and selected non-major systems, a TRADOC Systems Manager (TSM) will be appointed by CDR, TRADOC following program initiation

(Milestone 0). This will provide for the coordinated development and integration of user requirements as well as system support packages from the onset of program evaluation.

(1) The TSM will ensure that user requirements are taken into account early and continuously thereafter. . . .

(2) Following program approval, the TSM will coordinate re-validation of the requirements, as needed. . . .

(3) The TSM is responsible for coordinating the combat developer, user, and trainer efforts in the life cycle management of the assigned system.

(4) The TSM is responsible for doctrinal and organizational standardization or interoperability with NATO allies.

2.6 <u>Time to Complete Development</u>

a. Materiel systems will be acquired within the shortest reasonable time.

b. The goal is to achieve IOC within 5 years after FSED approval and to do so within established cost goals and without incurring inordinate risks. However, successful achievement of program objectives rather than calendar-controlled milestones will be the primary factor. To justify scheduling a decision milestone, adequate progress, generally confirmed by testing and including examination of the training and logistic supportability must be demonstrated. . . . Although decision milestones must be event-oriented, acquisition strategy must consider also the timing of planning, programming, and budgeting system (PPBS) cycle, and must be accommodated to that cycle.

2.7 <u>Program Stability</u>. All agencies associated with a program . . . . must resist attempts to change a program which is achieving established goals.

2.10 <u>Threat Assessment</u>

a. Consideration of threat and its implications for materiel development must be continuous throughout the life cycle of Army systems. To provide time for necessary research and analysis, early identification of requirements for threat evaluation is of particular importance.

b. At each milestone in the materiel acquisition decision process, review of the threat assessment is essential. . . .

2.11 <u>Technical Risk</u>

a. High risk programs carry greater cost and schedule risk and should be avoided . . . .

b. Moderate risk is a key to avoiding cost growth and schedule slips.

2.13 Integrated Logistic Support (ILS)

a. . . . Concurrently, the Army must develop, acquire, test, and deploy the required support resources as an integral part of the materiel acquisition process. Such resources, collectively referred to as system support, include support and test equipment, skilled personnel (including the training programs and training devices needed to develop those skills), supply support, technical logistic data, and facilities. ILS is the process through which these requirements are achieved (see AR 700-127).

b. (3) Alternative support concepts will be considered during the exploration of alternative system concepts to identify impact on system design and support resources.

(4) The number and skill levels of personnel required and human engineering factors will be included as constraints in system design.

(5) System support planning actions will be addressed in the Letter of Agreement and in the Outline Acquisition Plan. Detailed support planning will begin during the demonstration and validation phase and firm support requirements will be established early in the FSED phase.

(6) A preliminary system support package will be evaluated during OT I; a complete system support package will be validated before Milestone III.

c. Materiel systems developed or acquired by the Army must be supportable by the personnel skills available. Timely training support must be provided in order to sustain operational effectiveness for the life cycle of the system/item. The development of materiel and support planning will consider the growing number of women in the Army. Integration of the human element and system will start with initial concept studies, be progressively refined as the system progresses, and be documented in the logistic support analysis (LSA). LSA documentation will form the basis for personnel authorization criteria, personnel selection and training, development of training devices and simulators, and planning related to human factors. Human factors considerations will be validated during DT/OT as part of the system support package.

2.17 Test and Evaluation

a. Test and evaluation will begin as early as feasible in the acquisition cycle and will be conducted throughout the system acquisition process as necessary to assess acquisition risks, to evaluate operational effectiveness and suitability, to evaluate logistic supportability, and to determine interoperability with NATO systems. . . . When feasible and practical, the tests should be conducted with representative prototypes in realistic operating environments.

b. . . . if test results reflect significant deficiencies, including deficiencies in the system support package, the program will not move into a succeeding phase until all significant deficiencies have been corrected and corrections verified by retest. A deficiency will be considered

significant if it would make the system unacceptable for deployment or if correction involves more than the most routine engineering.

c. Development test and evaluation (DT&E) is conducted to assist the engineering design and development process and to verify attainment of technical performance specifications and objectives . . . using experienced and qualified civilian and military personnel.

d. Operational test and evaluation (OT&E) is conducted to estimate a system's operational effectiveness (including vulnerability) and operational suitability (including compatibility, interoperability, reliability, availability, maintainability (RAM), logistic supportability, safety, health, human factors, and trainability), as well as the need for any modifications. In addition, OT&E provides information on organization, personnel requirements, doctrine, and tactics. OT&E will be accomplished by TOE units using operational and support personnel of the type and qualifications of those expected to use and maintain the system when deployed. It will be conducted in as realistic an operational environment as possible.

e. Force development test and experimentation (FDTE) supports the materiel acquisition process by providing essential information at key decision reviews. FDTE may be used to develop the concept of employment, determine operational feasibility, estimate the potential operational advantage of a proposed system, and assist the combat and materiel developers in the development of Letters of Agreement (LOA).

g. Sufficient test hardware and elements of the system support package will be procured early enough to prepare for validation during DT/OT II. Detailed planning will be initiated during the demonstration and validation phase so that preliminary logistics, personnel, and training support packages may be evaluated during DT/OT I and firm requirements can be established early in the FSED phase.

i. In order to be prepared to carry out their responsibilities in parallel with those of the developer during the FSED phase, organizations having logistics and user responsibilities must become involved early in the program.

j. Planning for DT&E and OT&E will assure that DT and OT test designs are prepared and that test results are evaluated independently.

2.18 Cost Estimates. . . . Program cost estimates must address all resources necessary to develop, procure, operate and support the system and will be the fundamental baseline for programming.

a. Initial cost estimates will be based on rather broad outlines of the conceptual system and historic cost data obtained from similar programs.

c. Baseline cost estimate (BCE) development costs will be generated using the Total Risk Assessing Cost Estimate (TRACE) Concept . . . . . . (AR 11-18).

CHAPTER 3

MATERIEL ACQUISITION PROCESS

3.1 General. . . . There are four key decision points which mark the end of one phase and the beginning of another (Figure 3.1).

[Figure 3.1 about here]

3.2 Continuing Analysis of Mission Areas. TRADOC will conduct continuing analysis of mission areas . . . When a mission need has been identified, it shall be documented in a Mission Element Need Statement (MENS) in terms of the operational task to be accomplished (see AR 71-9).

3.3 Program Initiation (Milestone 0).

a. The MENS, for major systems only, is prepared by TRADOC in coordination with DARCOM.

b. SECDEF approval of the mission need is required prior to commitment of funds.

3.4 Exploration of Alternative System Concepts Phase.

a. The purpose of this phase of the acquisition process is solely to explore and identify alternative system concepts.

b. Exploration of alternative system concepts generally will be conducted by a Special Task Force (STF) or by a Special Study Group (SSG). A Steering Group or Study Advisory Group (SAG) generally will be used in conjunction with the SSG and STF.

c. An initial cost and operational effectiveness analysis (COEA) will be prepared.

d. The Letter of Agreement (LOA) is the requirement document supporting work undertaken in the demonstration and validation phase (see AR 71-9). An outline acquisition plan (see AR 70-1 and AR 700-127) will be developed by the materiel developer to support the LOA.

3.5 Demonstration and Validation Decision (Milestone I).

a. When competitive identification and exploration of alternative concepts have been completed, approval will be sought to proceed with demonstration and validation.

b. Army recommendations on the scope of the demonstration and validation phase will be presented in a Decision Coordinating Paper (DCP) prepared for Milestone I decision.

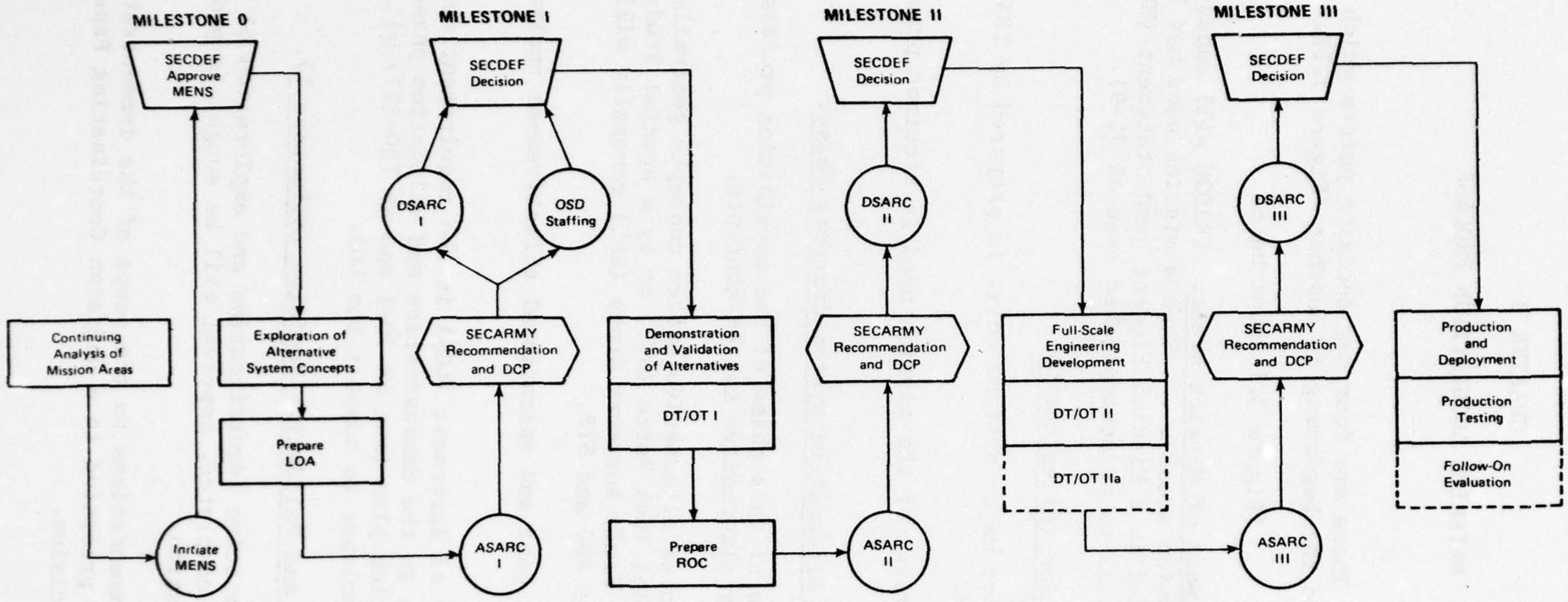

Figure 3.1. Materiel Acquisition Process for Major Systems

c. Cost, performance, and schedule estimates are not firm at this time and specific goals and thresholds will not be established at Milestone I.

d. Program management constraints will be established by the Army and approved by SECDEF for selected program factors. When a constraint is projected to be exceeded, the SA will provide the SECDEF with an assessment of the problem and issues and the recommended action.

3.6 Demonstration and Validation Phase.

a. This phase of the acquisition process generally will be conducted with two or more competitors.

b. Test and evaluation will be conducted, as appropriate, of training simulators, test equipment, tools, and other subsystems in order that development of these subsystems will parallel the development of system prototypes.

c. Subsystems selected for use in a system acquisition program will not be fully developed until the program has been approved for full-scale engineering development. The SECDEF may authorize an exception to this policy if delivery schedule considerations require earlier development of a subsystem.

d. Detailed work on the system support package will begin during this phase.

e. DT/OT I generally will be conducted in this phase to support a decision at Milestone II.

f. COEA will be updated using updated threat data, test data, and more detailed cost estimates.

g. The Required Operational Capability (ROC) or the Letter Requirement (LR) will be the requirement documents supporting work undertaken in full-scale engineering development or procurement. The ROC will specify the mission effectiveness sought in terms of performance parameters, not in terms of specific design features. Performance will be specified in terms of mission acceptable performance floors and a desired performance target (see AR 71-9). An acquisition plan (see AR 70-1) will be developed as the materiel developer's management plan to support the ROC.

3.7 Full-Scale Engineering Development Decision (Milestone II). When the demonstration and validation phase is completed, approval will be sought to begin full-scale engineering development.

b. The updated DCP is the major supporting document for Milestone II ASARC/DSARC deliberations. It presents the total program through procurement and deployment.

c. Management thresholds will be established at Milestone II for selected performance, cost, and schedule parameters.

3.8 Full-Scale Engineering Development Phase

b. RAM design, testing and evaluation of components should be integrated into the earliest part of this phase.

c. Design trade-offs will be implemented in a manner which gives optimal overall system cost effectiveness. Simplicity will be emphasized as opposed to sophistication and high priority will be placed on ensuring that adequate quantities of equipment can be afforded.

e. During this phase, the system support package, to include integrated technical documentation and training (ITDT) materials, training ammunition, training devices, and automated test equipment, will be developed and tested.

f. DT/OT II will be conducted during this phase. If DT/OT II evaluation reveals significant deficiencies, including any in the system support package, design corrections will be made and prior to a production decision, DT/OT IIa will be conducted as directed by the decision authority.

g. COEA will be updated using updated threat data, DT/OT II results, and updated cost estimates.

3.9 Production and Deployment Decision (Milestone III). When FSED is completed, approval will be sought to begin production. The updated DCP is the major supporting document for Milestone III ASARC/DSARC deliberations.

a. Programs will not be permitted to enter production on the contention that significant deficiencies can be corrected and later verified using production hardware.

3.10 Production and Deployment Phase

a. Successful completion of DT/OT II and Milestone III approval permit production at rates based on manufacturing efficiency, operational demand, and resource availability.

APPENDIX B

LIST OF ABBREVIATIONS AND ACRONYMS

AD	Advanced Development
APM	Army Program Memorandum
ARTEP	Army Training and Evaluation Program
ASARC	Army Systems Acquisition Review Council
BCE	Baseline Cost Estimate
BOI	Basis of Issue
BOIP	Basis of Issue Plan
BTA	Best Technical Approach
CD	Combat Development
CFP	Concept Formulation Package
COEA	Cost and Operational Effectiveness Analysis
CTA	Common Table of Allowances
CTEA	Cost and Training Effectiveness Analysis
CTP	Coordinated Test Program
DARCOM	Development and Readiness Command
DCD	Decision Coordination Document
DCP	Decision Coordinating Paper
DP	Development Plan
DPM	Defense Program Memorandum
DSARC	Defense Systems Acquisition Review Council
DT	Development Testing
DTC	Design to Cost
ED	Engineering Development
FEA	Front End Analysis
HQDA	Headquarters, Department of the Army
ICTP	Individual/Collective Training Program
ILS	Integrated Logistics System
IOC	Initial Operational Capability
IPR	In-Process Review
ISD	Instructional System Development
ITDT	Integrated Technical Documentation and Training
ITP	Individual Training Plan
JPG	Job Performance Guide
JPM	Job Performance Manual
JWG	Joint Working Group
LCSMM	Life Cycle System Management Model
LOA	Letter of Agreement
LSA	Logistics Support Analysis
MENS	Mission Element Needs Statement
MOS	Military Occupational Specialty
MTOE	Modification Table of Organization and Equipment
NET	New Equipment Training
OCO	Operational Capability Objective
ODP	Outline Development Plan
OICTP	Outline Individual/Collective Training Plan
OSD	Office of the Secretary of Defense

OT	Operational Testing
OTRS	Operational Test Readiness Statement
PQQPRI	Provisional Qualitative and Quantitative Personnel Requirements Information
QQPRI	Qualitative and Quantitative Personnel Requirements Information
RDTE	Research Development Test and Evaluation
RFP	Request for Proposal
ROC	Required Operational Capability
SCORES	Scenario Oriented Recurring Evaluation System
SEC ARMY	Secretary of the Army
SEC DEF	Secretary of the Defense
SOW	Statement of Work
SQT	Skills Qualification Test
SSG	Special Study Group
STEPS	Simulation and Training Equipment Sources
STF	Special Task Force
STO	Science and Technology Objectives
STOG	Science and Technology Objective Guides
TAADS	The Army Authorization Documents System
TDR	Training Device Requirement
TEC	Training Extension Course
TFPG	Task Force Planning Group
TM	Technical Manual
TMOS	(Tentative) Military Occupational Specialty
TOA	Trade-Off Analysis
TOD	Trade-Off Determination
TOE	Table of Organization and Equipment
TRADOC	Training and Doctrine Command
TSM	TRADOC Systems Manager

APPENDIX C

REFERENCES

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AR 15-14	Systems Acquisition Review Council Procedures
AR 70-1	Army Research Development and Acquisition
AR 70-10	Test and Evaluation During Development and Acquisition of Materiel
AR 70-27	Outline Development Plan/Development Plan/ Army Program Memorandum/Defense Program Memorandum/ Decision Coordinating Paper
AR 71-2	Basis of Issue Plans
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